

# George W. Phill Labile E. Noville E. Sugnes Miller E. Sugnes Miller Also Foster, Jr. Associate Editor Harb Fosuel. Mers Editor Harb Fosuel. Mers Editor Dallas Mellerde ... Art Disease Mellerde ...

\* \* \*

On Leave of Absence With Government Services

Carl Nourcoss ... Lt. Golosel, Air Forces
lay P. AuWerter ... Captain, Air Forces
Charles F. McRaynolds .. Coptain, Air Forces
Randolph Hewthorne ... Lieut, Air Forces
Kandolph Hewthorne ... Lieut, Industry
Com Fink ... Special Assignment
Saling Alfschul ... Special Assignment

\* \* \* \*

District Monagers: New York end Boston, Robert
F. Boger: Philodelphia, G. A. Ahrens: Cleveland, A. H. Bertsch; Detroit, C. W. Evaul;
Chicogo, A. B. Mertin; Los Angeles, R. N.
Phelan; San Francisco, John Otterson

#### September, 1943

Volume 42 • Number 9

#### CONTENTS

Briefing for September	5
Down the Years in Aviation's Log	5
Editorial: Horsewhips, Inc., HAD Som	ething 111
Aviation's War Communique No. 21	
Banana Run	John Foster, Jr. 114
What the Postwar Bayer Wants	J. H. Geisse 116
Bombing-The American Way, Il	E. Eugene Miller 118
Aviation Manufacturing	
Lightning Line Brews Triple Trouble for A	xis J. H. Sreenan 121
Design Approach for Long Range Aircraft,	Robert V. Boname 139
Curtiss Autosynchronizes Engines—Eases P	ilot's Job
The Case for the Integral Power Plant, I.	
New Guides to High Altitude Rubbers	Harry J. Marx 152
Effect of Spinner and Cowl Entrance Com	binations on Engine Cooling Julius Jonas 159
How Fewer Build More Bomber Nose Secti	
Super-Aluminum Alloys for Aircraft Structu	
Reconversion Reserves-They're Postwar W	orry No. 1 Raymond L. Hoadley 179
Conservation in Canada's Aircraft Industry	
Wanted: A Haven for Aviation Securities.	
AVIATION'S Sketch Book of Design Detail . Review of Patents	
AVIATION'S Engineering Data Book	
New Products and Practices of the Aviation	
Air Transport	
Cruise Control for Flying Efficiency, III Di	xon Speas, J. T. Farah, Sanford Hinton 204
Maintenauce	
Continuous Overhaul on PAA Clippers	
AVIATION'S Maintenance Notebook	217
Military	
AT's Key Them for Combat (Building the	AAF, II) 225
Civil Operation and Training OWI Lists CAP Accomplishments	200
Along the Apron	
On Patrol	
Side Slips	
Flying Equipment	
Halifax II Features High Speed	232
The Aviation News	
National Aviation 267	Transport Aviation
Washington Windsock 269	Aviation Abroad
Calling Names	Financial Notes 279 Aviation People 281
	Aviation People
AND 1111111	

### Briefing for September



the the receiptionary Lockbook P.38

are called forth a let of criticaen. Then then if proved freelf—in enery theater

come the criticism turned to wruden.

they first again the orities have been speed, for Lockheed has rard put in

spendion a mechanised assembly lies

Safa impleme fashinane catego Itali

ler if's being done in told in complete ddail on page 121 by J. H. Sousses.

feet well mader wrome for a long free. de AAP's Arr Transport Command has fore on amazing you of "yittin" that

lated with the receipt." Decempedat

"Street Bue" to the Couldness Auta-

west ever the route to find it doing a

bory day, as Assertions and Allied air

power guan in afrength, a complete un-

way becomes more emendial than ever, hills second of her down to been tealer

With Attacher's manager office

four Miller rate into the doctrones of

espicement of agendi types which,

letters a backing of real experience in 205 berrower in side was are still

tiley shape. There are, between our

Tot offered me of these Offered

But answers with making constraints

Tree, and on page 119 he discourse little i notices on these reducts to bearinged.

her-way job all at once Page 114.

many mile the section, County and

(ightness first appeared, its radical de

Sabort V. Benne, whose provocative method on Design Approach for Long Energy ing B-04 Liberator non fundages, but Altered to this country with the Erriger rance. Hery the sameour solved their passion, with the result that force Japen-General Aviation group. As boad of the accordination department of the Forest Propert and Lieue rempanies, he andreto the feet wand tannel term on "metoclass models" in 1984 and large-based the hard month in 1990 and infrared the fact were in su many medicin accounts. As combe handed such projects on a modern towing tank for high upond and dynamic tests of hears and sruplane models, a supermale word round, and research in engine rooting and oveling design. In 1997 he became third engineer for Air Propers Trees. be alliand with American Report Airlians.

Case for the Internal Power Plant, the

sedestry leaders and william race as

With measurer fast becoming existing's No. 1 problem shift, meeting larger

related by become tomber and foreign

workers actually time out more tasts to debuted and theologist on the least Englasers been only too well how atbecoming a series of the traceres, but forcesse and how tough many of the cannede, one he found in the very nonof a plene, and in The Effect of Spanand end Coul Entrance Combinations on Engine Coulley, Julian Jenso, power plant engineer, Beenh Accept Corn. recently westfind apprentions, with one rial revalues on course drawn theory

and effects. Page 100 Perhans as other industry offices until courses on these confronting the room showed with building alsolvens to win their employees to do when His over. Financial Editor R. L. Headley bas thoroughly analyzed them. He presents the suites of a program of consider

Country rengion mencels

Complicated Voltage See Direct plant able value to the undestry. It will be faced out only that problem is build- frend on page 178.

#### Name the Venn In AVIATION'S Los

25 Tears Age (1918)-Summer of Dept. of Commerce reports ther on report by Secure Sub-Convolute on 15th anniversary at Oring 15 S. had report by Decario Dad-Controller on 25 companies operating 25 sixways year 32,700 mi, daily. Licensed pilots cally seared because to July 1, only 87 of 805 American made 100.6% had and 47 planes and 6 engines carried American holds lines and see one American holds "those" or heavy broking place had southed the front. Appeared Type Coefficient . . . New planes annexaced meleder Velapers Wright Nispan-present Spiner Liber or Rell bindage, two place cantileres wing Knickers, and Waght Hose-neward New Stendard Spince open manufacturers who, though uses: controlled the arrests program and universated to in rection of the

16 Teers Age (1928) Navy's "See Heats" and Army's "Date Medianeres," letter group led part of the National Air Barry on Los Anarles . . WAE begins hi worldy passenger service from Les Angeles in Salt Lake. and TAY steels several service on East West posts and orders 10 P & W reserved Fred trimmen

10 Years Am (1932)...Arry Cham her presents code for except many population of approved European farturing and transport industries operations under NRA. Manufactus at 30 and 40c, per br. . . Chamber also reported U. S. strings russed 229,675 passengers as feet half of pear, a gam at 6,000 over the 2022 period. Passenger make against 20

percent to 73,227,579 . . . Con. Ind. shell wasden hour from Chesan tin counters rente aller Der-work

back pressure then reduced to an infinitestated value. rendered are taken by a remeative eathersonner to within 002 stee. Planner Standard Europeans call-This masteredece of equipment design exemplifies the superior shop and inhoustory practice behind the precision-performance of Planter Sectionary. ---I n on important member of The britishs Come" which it Sentje pleate from coon to cond to speeding to our fighting trans on world by till from

Ultimate Source of Altimater Accuracy

As fine chromometers are my by Observatory these

securacy is the Master Incometer shows.

AVIATION, September, 1983

Best Jorgan Time a contributions to America's are here: though his tarky supercharger, by inslied Mem now turns to The AVIATION, September, 1845



#### History relates that when Forestey demonstrated electricity in Classicone, the great estatement recentled, "that what surely good is their". What held a wreates on the templaces was prported to U. S. Casar, the general absenced, "But what could it were in good tort".

GLAISTONE and Graze once west into basic-set spetcher. Combining the hoppy qualifies of diplaneary and supervision, they soon that a sight brink basics in such steples as not recognized, the control of the combines in such steples as not recognized to the combine of the combines of the

So Mike and Alex left and west into business for themselves, and they've been deleg succey over rince. While Glodstone, Grass & Co. stayed in harvess and (it) bearing axis, and Solded like a tent in a beary wind.

There's a point to this little fable: Today there are many processing to fall the third that the process of the process of the see also good to fall the tents when the poot-war trade units blow. The secret of many businesses after this war will depend upon the pluming that it being done now. On any problems involving the one of

The success of many businesses after this war will depend upon the planning that is being done row. On any problems involving the use of peculials, machine tools, we use you to call upon our engineers of peculials, machine tools, we use you to call upon our engineers of peculials, machine tools, we use you to call upon our engineers of many of America's loading companies have been doing for more than a century. Call upon them used.

Dairered Terret Lather - Fey Antonatic Lather - Joseph Circular Street Lather - Optical Comparators - Antonatic Opening Threeting Sir JONES & LAMSON MAGNICCO. SERRIFULLY PLEMONT, U.S. P. Coffic producting Manhing Tools

AVIATION Sections 196

## Aviation-A Progress Report

The Lessons of War Become the Key to a Richer Peace

Twists, Provingers, Stein - stepping about to monectorin exceed the that is not all offer they spell out across the blue waters of the Moch territoria a pattern of invocate that has proposed far aince but automate first maper Commendo operation against the Fengels cour.

From Dieppe, you ensumber, too many of the safety were got body. But in Tuning, and on

through Skitly, the Allied might plosted meanable forward, winning objective other objective at a surprinciple low cost in consultives. An superimency over the bertlefield? Yes, But we have knimed, too, how to save lives and, alsotten the war by stantage, sir

beathwithout as probable to strain the filter and of a relief of affilter to the strain of a strain of a filter to the strain of a strain of a filter to the strain of a filte

This fact is confined by the odd calculations of the exponeithe stategors. It will give attached ourage and confidence to ever member of the search forces and of the house fronts throughout the Duited Nations.

For instance through startigic bombushams of an objective reduces be nowle fifty per cost the staffer forces required for invasion. Antisepted lowers are colored from more than fifty per cent of the original ground force to obset beauty per cent. The color of the original ground force to obset beauty per cent. The color of the colored from Route - reduces they per cent. The Route - reduces they observe of the powers.

The inference is clear. Effective prosecution of the war will require smaller ground combot furces and much larger are forces than some of one stratepers once thought.

One must retent need thou is for even mountain.

One most suggest reced, there is for even mounting floots of account. And, fortunately, this is yet what we are getting. The American account industra now is producing as many singulars on all the rest of the world combined. In 1938 we aimle 100 planes a month. Now we easile three times that mans in a single working dark in the first plane.

But at this wage of the war, types of planes are mercinsportant than nore numbers. In the sarrly months the program was heave, and properly we, with single-enjus chance. Then, as training planes seeminsteed, the couplisms shifted to heavier types. Now we are hunting out.

unity it pidopte in "Then, as triming planes updersaling the pubsion-production or securities and associated to consider types were because the public of the control of

of this one type at a nite adequate to replace the normal house of a facet of at larst 1000 Auctional howly bombers operating as configurated, as the weather will permit.

A glimpte of the poundage production non-help us will further to evaluate the miscolous achieves means of the partition inductor, as a when I was

monts of the available malestri at a whole it we sweet (100 in 1941 . . . 201,000,000 in 1942 . . 911,000,000 in 1943 . . . and 1,417,000,000 in 194



- if we need it. There you have the magnificent destry - a monoment to the consention of industry, labor, roversment, and to all-out tunawork between the aviation industry and those other industries which have converted their tariffice to the

What of our engages and our Allies? German production probably has flattened out at 7500 a month - with document or more to bemodiste sensoret. Issue ma he able to employ m many as 1000 planes a month - until We get our

new lone range super hombers in sufficient manbers to whittle down that firmer Italy may be able to best the management Axis monthly total is 4000. Add to our mouthly score of nearly 8000, a total of approximately 4000 for Britain, Canada and 12,000 monthly. There we have a three to one advanture for our side. And between our own rising production and the building operations of our bomber commands we should soon boest the ratio well above that forces. Therein has the certainty of continued and exercise six supriority ever all the

ion/home bottlefields. The critics of American aerolane quality have been four to one. In the Parific where our house arrest and accord places are knocking off the desperately stripped racing craft of the Nippowere, enemy losses often mer or high as pight to one or more he the Mediterroren theater where the Italian new abundance he their Albes the story is much the some Oals in the well-defended houseland of the Nasis do we sometimes drop below the average, but even in those own instances the ratio is still well in one finer and the effectionness of our hombardsocut

Behind the production lines the battle of research and design still years. In many a hibrentoey night shift, on more a secret test field new and temble correies for the corns are in the making Septebombers, destined for Tokyo, have long since passed

is adding constantly to our matrix.

out of the design stage and the Japanese may lama about them almost on day New discourage da usual to say swift and ultrat devastation, are farther alone than our enemies believe. No loncer will for or storm or might be penuitted to fight on the side

The worn of priemer who are toiling to beneful the borizon of our knowledge stand today on the tireshold of discoveries that have been sought for centuries. New reservous of power may soon evert a performed influence in more fields of technolous

and through them on our way of life

materials become available.

Once the war is won these new discoveries will be templated into better loans. No loaner will countless thousands spend their lives within their men communities or countries. Now efficiencies in transportation will have world basel within the reach of many who once had to stay at home. New family vehicles will prejuste the skeways as easily and safely or the highway. Already more than a drawn mountainment of services white subconbiles, and electrical conjugate are designing, build me, or fiving rotary-winged attends such as the belicopter or autogyto to meet the needs of tomormov's families. New and rafer strends of the family wine type are made for production as soon as

The quality that now makes each of our war mes will be troubted into the stock velidable demanded by reserving operation. The devices that seek out and find our energies believed the seal of for or darkness will, after the war, reduce weather howards to the point where they will be no entitor in the six them on the record

Science and industry will continue to do their made a better place for men to live in, statesmenship must not full to do its not



## Horsewhips, Inc., HAD Something

better whops couldn't be hought. His father had made them. His granded had made them Their products were easied sought by conclours for ladies in extending farmers, and Non targets The housens had their of and the family had nonacred for four generations. Each time the factors was baseled down to a son, the father tabl him. "They will always need whice." Then come the day when the char of a horacless

carriage up Main Street seconded the death knall for Horsewhips, Inc. The ermolised lattice tracked in their fine consider for create, hyper-transpot Maxwells, the faresers began to mechanism, and only the hus tamory continued to be sustances. The old man passed on in unbouriers. His see new reof guselless in occtain Republican states threatened What has all this to do with aviation ! Just this:

gov in the flash of their anymetrocably brilliant schievements, they are taking a little too much for created. True, we do not dealt that "they will brave need agreed?" but will they be airplaned Morror on in the alephane husiness are inclined,

ternel to the any of flight. But with freshes a but a part of the age of the internal occabination verse. All of our transportation process in the of a report officials and most compast remos service. Introdery has worked wonders with the gaseline recore. From a crade, being relication of metal writing many pounds for each horsenower peado ed. it has become a beautiful mechanism of fr. of power and lightness. But we way he reaching a point where the oute recentains way to meet demands for more power will be to increase the number of evinden, thereby conditioning the recelerates. Home day amount constraines in rotter to develop a keesed new approach to the rephiem and come up with a new power pack that will be more efficient and compact—so much were so the conding region was ever its rendessessors. And some who freak engines will not work, to open no our mands and go back with a fresh outlook toward. Greek, turkines, jets, remote power sources, and

man farefathers did not get very far until they tion was more efficient than translation. Comme that a wine derive the left by retation frateed of that are now either firing, designing, or shoot to try to design rotary wing amount! And it is to be noted that some of those communics are very sub-It is no safer to any "they will always need gas

engines and fixed wing apprend?" then it was for the few experitions of whip makers to say "they will always great white." We wont take down immunotical idiatic ideas of yesterday and re-examse then with wide open minds in the light of the most recent developments in metallurer and other prinners. Only by drive this advise it hencetly and fairly........... we arried the and whate of the fifth old

Yeslie E. Turle



#### America at War

Allied air newer efficiency increasing swiffly . . . Stallian investion gives alldary sheb-in-the-arm . . . provision bombine scores nonin in Planett rold . . . Poelfic air power growing faster, but vitel Chicase bases still in realm of future . . . our production gales have afficials worried . . . sirmell situaties continues redained.

NAME AND ADVACE IS PUBLISHED SOME GOVERN ASPERALL Shelly, but the fact remains that the elider reservoir correc while Nam avintion is unable to tanch the substress facilities of the Ported States and only to united those of the British. The paly thing that can News dispatches report goodly partions of the Geron the enemy's aventual decline to zero air power is man populate moving fearfully out of devastated or mation of hostelities.

"marked" cities to get out of the way. Thus for thus Sunits of Allied attack on Hitler's services renderesafe's fighter resustance is observed by our bomber and France in hard knots Nestral sources in Engage are heritague to wonder eless to be growing weaker. Goerone is shofting from how love the German receile can take it. Thorsands from the attack to the south and west. Our moreowing they have been brought to relief centers by trum loads. ones is following them west, and positions in Bindy What knowcood to England is peasure by comparate and, merhana Baily our helm meet there exists south. the hitter and substitute the Italiana ment it defended

Harebure was recorded into a heart of ashes and or not-indicates the Nazi leaders recognize this persthird of a L000,000 people living in its barbor area some blown out of their house, by saturated seen attack. Then can the erest part placed by air never careoffer American, on reducing Shelly to bee then exhalold time ment containly out Ditley book on his way berdment of England. The population—the workers dewest diet. For there was employment of air power -of the energy country are just as much a part of their a elicient as has been seen in this war. It included forces against us as are their physical wheels, their he become one to date of citizen and etider men here office shine and planer It has all tended to revive some of the organisate runiar has already been changed to prevent their of precision on area bombung. Hambery in its on-



their indication of air land, and one transport and loss of air beautiful and entired aircraft for AVIATION, September, 188 AVIATION, September, 1941

the upon them only too well

searrence. Perhaps the impetus didn't come from



Avery Air Person Air Transport Command schools on the "Berness Son" aren't delayed by sarge besting, wheth has been developed into a fine ay, North than two team of cargo are man-GE leading at interconfines Council American points taken but and

## BANANA RUN

into . . . . . . A first-bend report by an AYLATION editor who flow the

By JOHN FOSTER, JR. AAP'S Air Transport Command not only flies " but freight" to Caribbeen Defense Zone, but also does outstanding diplometic and training

THE CALL IF the Beaum Res-bed is down't the beaume, because too war theater, the Bremmade-Penama Air Force for Transport Command or

reate to get the story.

street one, but is done a four-field row. struction job whose value will last for For first, if it refline men and materisk where ther're needed when they're possibly ben; there, if y doner a darkmatin lish that committees and morbeill wanter with your accomplish and last, but for from least experient, if an our in belowe keep that theater a compaling a unit store of operating and

Lest how this form-field took is benefit round trip, one that began, not to propermandisms which make the firsts St regular scheduled operations that her of the last print bears over an last benier than others. To start and deterin completion of the north-hound solely sire got how many schedule case michigane reen, company of cities employees of the contracting excesses strine, swarm over the Duncies Call that once were becary from and fell

more than by a proof feet

C-IT's, their entro-lunding contraping there exists corried in recogniti

ATTATION, September, 300 STRAY ON September, 2043

of the "work-house of the Air land" completed the north-bound run, or service and undefinition of a new Tabeliand was on its way agent was fedly headed, within 19 hr. In saidon to keeping the planes in the the bear dely the mistance mais are eventagely transing new oreus. Janux enlisted men in Duncles trans-Arm handless, the two remains has budy developed into a fine art. Typiof war the job does that night by a

is Service Command employees, who dot 4,700 lb. for three separate desdone on Ti rain. They followed the mand officer was on duty—as he to he for Ferrier Command which has the all the ATC campo match it is tied from in the plane, has done un maintend. in for loading through narrow doors ad to cooking in light, yet stardy een men which mean more every and ne reskyne meterial. Of londour, of min, relden if ever requires more the than re-freiber for more than ou is here been connutrated a cleaned less the edges on from 22 to 35 mag. Ferny the maintenance and busher, one done compliancemby. ATC and ion efforts had been properties flight ien, briefing student co-pdute and staof preparing electronics. At least

cresh the efforts of Bosses Books batel officer, Max. Flord H. Duredto a ferner sixting pict. Working in during a consequent with the pict. blace of the Mexican Air Force, he al erraged for a representative, expresent to secondary personally papers for the rescon court, in, or call of Mex. to because offices. Not only has they stelace proved peak many efficient for the line's operations, but it has erped materially in bettering under-Coder between officeals of the two Stirculed departure there were at t tone boar by the General Merry

the chick ender which the line open-re, her t was a long time before dress rise, with the other planes telong to is us, the ATC contract pilot school, of both military and circlina personnel. American Air Forces personnel service photos That are we waiting for? He came " men it getting away a few meaning there exhete exerting in remarks the first getting away a new meaning short time, for Eurana Ren pives of the first his every so right and resho



ATC's Barons Res in doing on extrinoiding job training young Agery prints in lat serional humanest work. Much of the line's terring and washer such as they are "Madella regard —very much him do tendery transition poles may meet here on in very thence, where they will along for held as posts of logs on many meet.

operator-plan a student co-pilot and "Old SI" was well within lead limits that trip, but some of the same was bolly Principal mainly class was been The one-operated customs and humbresthen 1,000 ft, of mail, remething whose tion ground had been yest by the pervalue cannot be over-extremed, for the line has set former delivery time of route to take command of a new road (Tyre to once 204)



country on which it is heated has military representative, and other Central American natives have cooling proposessations to handle finds electroners. Clear harmony as which they work as trained to deployance and international solutions job being dear by ATI in addition to getting men and majorally where they're percived in a burry.

## What the Postwar Buyer Wants

Serveys on why private pilots gave up flying and what former owners thought of their places indicate changes declarers and manufacturers. must plus feday is order to create and sertain the potential merket.

I NEW IN LITTLE OCCUPANCE that after to keep 'ou dying. If we are proposed,

I the war there enable he a vani on. the beam will be in. If we are not the leave will be on IV we see not private from other the war will soon necessary in our product we must plan than anyely the accumulated demand them now. Unlike automobiles and refor removal classes imperators, which might be put on the Accreaging studies which show that models without serious reassessment. the ratio of new piloto certified to stadest certificates found remained whitehealty contant at 15 percent large very of the market prepared by Form 1992 to 1996 /see Pin 11 the war and could desired any opporin 1960 the author made a state of taxity is reacht here of aiding in the private plane swareship from the respostwar reading/meet ords moved assembly by the Armounts-Ideas will differ materially on to what nd Chamber of Commerce (Fig. 2) This carry has been extrapolated to 30 extremely assessed. However, let's ur. the begont period of emperation and make the secretary of letting the fire

surroud for one individual. The enerage term of evacuable at 25 per and He to an influtermally small fraction of the remote market and a second suichly. Assessed where life to be \$ conferent already. We should be races Tr., this means Mr. average present comsamption of suchalf a place per super here, able to sell and the may who so arecrud a membrable rots of more than howeth our revolut and described it four automobiles Street Streether

And both the study and these such made by the CAA in 1960, ever us name sectioned to keep at it. making on to what changes maple an-Peace will hring us many trained over objections to private from Inpriots on emplowers, but we must make improvements and references in plane. Solders of student persual who bad docontinued training before securing a UAL CERTIFICATIONS OF obot's certificate. A summary of anwere married from 435 of these former students in thewn in Table 1. In the other, manifestatives were sent to of 350 renkes received, 184 wave from

owners who had received no revenue from the operation of their plages. or too train by the designers are ladd-15 held some form of mint's cartribute during ownership, but at the time of print complesses of any hind Cost name first in both surveys. Howto always woothed assessed value or ceived. It is probable that many of

from nombelies renters to first such able land. Cost increases with ma hence fewer fields can be reported a one stype of about seven acres, m antreat to the present average of 17 acres for non-scholaled simple, midbe an anower. One-way laminer stone require sirpleses constructed as the can be landed seeily in ermercials in relatively unskilled priots. The case undersarriage or trurycle herdag par would make this possible. Initial out of strine weekl be about 1/20 of the stations might take vary of both to

these who etected instruction or you shared sirriance (other than force atunderstand (Inneretal reverses) could have

The first sirrolfeast stop after an as the impressibility of airports. The is a definite function of size. The hope the servert, the further can west p

would result in a not gare.

as series in the "fir votated?" service. bigiveny and the leading strip late it after a partial solution to weather and exercise their at almosts. There are tile to turn in his place and continue already endications that some oil onis trip or return to his starting point peaces might be interested in building ir other means of transperiation if rath service station. Although per to weather became unfyable. Misservice does not appear descrip a collect of the servers on a years for to early be released to a minimum one the individual plans would not givens up Sying, it is known to be or iem to be kept out of service well the of the most summon convenience of the metable affect Com sould be reduced economicalizate ir osestán perchase sud policionance nerworks to the lack of villey of to A feetble rate streeture could excelle private plane A actions drawball a to fow of traffe, been ferrying code the possibility of being forced does in tree, and encourage shells in occasion isles of equipment with changing

weather. Now the threat of o fuuncally precludes any attenual to make a less by simplese, Roudable simpless. or Orier extensibiles would made a dare the employ of trips which were have to be given up became of weather by the difference in speed in the st

lades could be folded back over the of surface which were kept within the inflations of highway regulations. The TE PLANS OWNERSON MORE propeller exact he disconnected and the tions names delivered to the year 120 banky on highways, this vehicle was

for fiving under the select and ole to make a trip from Washington Miss when weather had formed down spines attemption the same reals at Se mus Gma. A third these later Wolds Watermann reduced his "Aspertials," a tailing Opiner with removable wings, Like to schopen, the power could be debtend maker to the propeller or in the not which It was also somposed with budy peer mitable for fagit streps.

sal on the ground and not by the done

As alternate and quite different as

a sail for the written widet who m was

the attempt to mice the weather

publics was made in 1935 when the

trainment of a roadship antogryp by

to Fireira Attagyto Co. The retor

on of the had weather. Also it fre-

and the test vender. Also is the

Wisser of the Dept. of Commerce solety competition in 1954, the Hammond

The body arrives alone was emergical for of an automobile suggest, used to polyee a tiste in Los Angeles es an awioesobile ovet None of those changes in design our an Syable for early a abort distance and feet can be recemed if there is some be made without some reduction in touacresed. However, one of the most with the handless of the added weight my of passing through the affected significant results from the surrey of nat owners (Table 2) was the revela

WALL STREET ME MAT MICOMA PLA na for ebioletes student m theren in springer To Selectedes desire in Er Two rough there had gotten in able of and, waiting for gives or to bundle states made bring time empired to ---

-

WHY OWNERS BAYE UP PLYING

the print as expected.

detrant mer or

Time to and from atmosph

er to boop in precision

TABLE 2

WHAT OWNERS THOUGHT

OF PRIVATE PLANES

from that for the most part they would have excellent great for lower landing on and render comfort. farmed this when too speeds were probable sell value the 190 man estin no rate often specified as being comtial to permit the postwar simplene to urable wind comblines It is also notable that these owners regards seemd for characteristics with title or ne compensatory effects in possitio-possit time. But general asconduite planes, for postedl services culy make up for speed and time lost in design changes but also pe a long

columns of receipt who have howeld clone and found them not worth their Settley He Decade delice that such theory will retire all potential postwar centeners. For any

correcce in the site of the planemaker's ing people who have not bought before. And their weets may differ from these The man we have never been able to who hangs around the arrecet has no sell. There is a wide divergence of Ter Latte Von Maria coil. There is a wide divergence of

tere emicener, wants as a plane. The enthor w convinced that is addition to elirect him with one that se safer, more (Form to more \$12)

LFIAT: ON, September, 1842. AVIATION, September, 28

#### Bombing ... The American Way By E. PHOENE MILLER stances filter "drinter"

lacking in all fages removed-rances.

Our destrices of employment of hambardment forces are taking shape more clearly as experience is gained. Discussed in this article are the

fundamental determinion factors in their efficient use. T ME are and in a relatively new miles who really anderstand correct ample forcy breach, and as a consequence ment of six power in all of its plans manual by all betterrees more. The renkuor officers who have just comcleted advanced flight trusuing does not that come the present war become age north who, after beans cores as sunch walle, still were found considerable

#### my field officers as any of the organs. Librarian, a thoroughly trained and ex-Definitions of Tactics and Strategy

there are inevitably too few command-

moltion for combat. Turning any the mean proction for number. Tarker are the measures designed to defeat the appropriat, and ther are seafied some crainer whether the may are appears square created wanted to poss podoce the another of times a tartical In cits an essemble, an essent soldier in alared in an unfavorable neutron of as a secompanys and also definisely affect the abil hand-whether or not he in well around or well find-a metrical shappen occurs when section. This alternate abjective of all mile man he fermulate prevented or favorably re-

This lengthy dwelling on deduction as im-porture if the full significance of bombard White strategic operations include taction? servicule, it is the strainers force to the

> A beauty arrogal course now to such or demand to result A Suprity arrivered critical play to could be glassifed by theme the heath to full short and skip up to the sides of the skip without acceptation. Bond will then and and exclude automate united

lightly abraided better. If normal printers aftitude installi

really condition to derest the contin-In total war, the obvious functions most of fighter or ground scene next floor of teefical proportions eggreent any more than an ortifar unity because strategy designs the encessive can be trusted with the fact many revenue interiory assume our word on infantry employment, are war in conducted there can perce With the making historians of an

pericocal bomber commander is a

approximate are continuous wherein the

lentimate and continuous overlangue

of employment depending on corne

stances. For exymple, a Schier cross may effectively perform the tected functions of defense and ground up

of supply and from of concessions.

is meach strategies unapum but there are be a lawsted recognizement for tactioform montements. It was not more to many instances to bisce polatroir unsuspens. For example, no beligerest qualified officers on charge of coalse area has really exceed automorture former. This was not a private sandfile. act full complement—such could use to officined teachs or owns and that were defined doubtes of air power curier if, or even stopped, burning replace The bombing function is unique in to it is with the strategie heavy that it is principally a strategic from rather than tactical, so are fighter set pround support tents. Therefore, is

d sower to resist. So long so the war other air force divisions are employed subdivision within the bounterdays: ated with restant to testim and stratur and which fairly parallel the should cution of bomber serenaft types, in-It is disperses to poperalise to the betting two of

rents. Indian at waste to 

ship can nametrate, at lower range

wear territory, striking at his source

inter, a heavy looster may be seen on toop carplacements However, it mportest that these manners be on

addressed on he he within the limits of

instituted and employed as efficiently as possible. Their two on any marries.

individual runs. After agreed they may or how as formation for married exvisorious from prover falters. Since each place is approaching differently with respect to the wind, the bondgive on, there will sever be except available types exacut effectively do the The lone refers house booker is used

most effectively for coversions well be-

Minimum Attitude Sambles Technique where plane approaches at high spood and at less level beneally to man target with equal effectiveness of a deere his. If it falls too short, however, it may provides over taxons. This is producted the ment accurate hambles rechange condense!

this specific aperation, since bomb should not explode and it has









Greatest probability of acceleg maximum number of him on surpri is where such bombo takes stable underdually. In stands desirted here, a number of humbers are approaching







#### "Lightning" Line **Brews Triple Trouble for Axis**

By J. H. SREEHAN Warts Manager, Lectional Alexante Corp.

other than having prerputated itfor to the flaw of scotposonies that reached about this revelopment e pinne design. what measures in all theaters of the d shoet the pleas's possible perto and characteraton, and enprobable perfurence. When convered by artical flights, the

he ever memoure demands of our Air Francisco and and and and all the All-From a production standpoint, it Tookteen's faring contains more sub-

complex, has more compound correct less steel that presented new formula and webling problems which had to be production problem. How well we have selved these proame which has already and hand upon handreds of P-38's to fighting fronts and training centers throughout the world. That volume has yet been more than doubled, and may shortly be tripled, both without benefit of plant expansion. west be readly admitted there were abundant grounds for skepticion. The

secondition than any other fighter type, munestruct a nealty fourth morbies of preferation. He more than \$2,000 in dwidnel parts to about double that of

Wer could be put into layer scale but. . This shopbelsm on the part AVIATION, September, 184







roted in the name reviews about of the years of the twee reviews, the small

standard designs because of their small

me, shape, smooth skin surface, and

there. Dresson the unurasity heavy

consecut four blent markets game

ed one Nam exceptive control

senseed why it is absolutely persons to make metalletions throughout a assembly starry on reckpit representation will be at a minimum in final prompt The most section is one of tiens major fuscingo componente and is m sembled rather consplctely before other are would to it. Pre-amenator sha tural members are joined to a jur &named to residir cotablish and corners the hothly critical dimensions and a matallations can begin there alrest a such as in progress, the stadled from core as initial structures are taken Berezus of the compactum and Greed above, with punishing income hildy becoming more and more was as the section grown, this and all other manufact sective the greatest possible quis free in unctalistent to assume of samuely. This number is comits: able owners than has been common

Highs and left lower "quarter pends" and in mells channels, and they are and structural members of the court and in the half-media parts for quick with are pre-assembled separately and replacement affecting poxed in indexing pay designed for poster accombility. maximum reserved working posture. At the said of the finelage line, a Pencie and streeteral members as day is etasked to the assembly and it equipped with the major port of the searched by traveler cross to a postlabor, wires, and other seatpeant, in in the pre-making "concres" of the before being seized to the some section, buty group meting department to await raiot, a considerable portion of this smaller space most be natigned to soof consentration of accrement within accommodation of versionly bear where

Making of none and only protein absoluted to the reader wing ordine, which follows panel pick-up work, a schored on elationary jees that for a part of all retaining the latter inanother "station" on the line that against (became of its shops) as the which few the mess and side punit boar given section." These offer drill.
They are movely technol together in the new particular transfer are because

a specied seadles for fluid streeting. ogpay of more parts, pleasing, electroof severest, armount blast taken, cont plate, and installation of the semment ecopartment floor. While they me nove through 15 moreov eleboraa smerge ready for joining to the one-An existanting feature of these station in the industry design which perat mintion of the amountly for more permissi working porthers, Seldon. des se assembly remain in a single ably greater than has been combin position while in a given working post-practice on any lines or those of other may or station. Resistant place are not agneted to the sendles, except words.



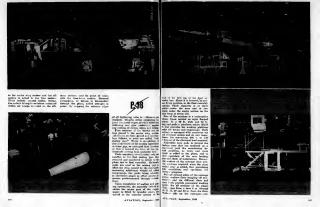
water of wells, brackets, and this, the latter best-jerned and, like all other Installations, following the restme P-16 surfaces, Such rivoted. The small used throughout on Laphnesia assembly. referror descentions and extensive one are streamly accepted sends the house Mr. in care life time, and then moved the strength in arborred through the of strength steel in the bosons further mattern indiger the first motion is been and the motion in the strength of the strength of



Add the problems posed by doubling

of many instruments and scatteds be-











and part completes as operate jet, intend agency of motion request, and group bestern of motion "kin of parts" meried for jet, Kin are stored as product on bias the "plants for any west, it may along along after it specified thin.

ready at 4 in per min , but some to be in-peoples stations of the line. Size of the saws "per statues" varies from !

Detume of the large number of peremployers, meloding a high percentage of money must of whom one without the hermote of the new legals operated on se "treese" by consider that only maturally somer when beneved to rether and which are released by hand Dear

lines moder the last two please on Br the section, the Mart by is present Provident its bently as the sailt on the section in the second less by trender seems

be moved and the corrieges, or pithout from our charles were naturally benforehood My here will measure either the curvegy or the mose wheel to the dear-line of the third leg, and plages one be wise; there, actor on and some off of on monated above the floor and on the feet, and they are covered by biaged

Traveler areas are located at the said Mr. current sidewise, on fat stud ritto embedded fresh with the partiess. from the first to the scrowd logs at the deer and of the building, and from the fast less and under the first law of fire seen to the third less at the beringen. second leg, pull the cour on the fint and licewerer, when the carriage is not and pask if in the opposite director in lifted of (in the transfer area at the

The exprises is then estimated to the It is in the transfer area, at the hour of the first leg, that the nartially aparmbled whose is bifred from a few to store. When fastened to the carriage, the coupler is entaged to the second corriege on the lies and the where hecirc its trip through the 30 amenably. one sheekest, our imperior, and one re-work stellman of the box For the first two legs, the certifiers the building foor and preject toward the sheet 18 in, from their exposition bases, providing an "compe" area in secretarily stronged off at the side Three platforms along the side of the

to precod through the final leg.

tween stationary and moving platforms The stationary side obliferon are 44 ft, wide and provide, below their form bine of varying since for pointed one storage of party and tools. At the outstile or back ofer of three platforms are almost opationers work benefits materials. Air Kees, with frequently spaced catlet points and power eco duals for tools to be used at the hearbon are provided at the best often of the ing tooks used on the carriages to the brush outlets. They could me otchiose supported to the moving corrigant, and

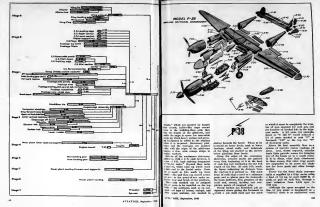
Non- are fluid with the side working

levels of the carriages. Cherapse be-

nde stand workers ment use cutlete en At convenient intervals, the continuone work beach in broken to provide space for 6.0s. wate "maraning tree" racks of metal trans for capping, mak at screws, rivola, helts, note, collects, washers, clips, and soils of small wire. The amortional of such items at each

bealism is selected to meet the roughte-

AVIATION, September 190 AVIATION, September, 1943









est come these instructions: the one paler Kits 23 L and 25 L he star bear sed boom work. That man using 102 20 L down Life their man neing Eit 11 does control We man maker Ext 10 R down SH. 700 men tunng Kits 22 R and 23 R

setface control and coolant r sable systems are to be brought Service. All breckets are to be ed. Due to the complexity and a of this apprehise the fire men to work through Station 1642 on ship. This will require a second wal free men to work on the followskin. /Dr the time a third ship. a the hee, the priviled even will be clable to take at core. It In the first stollars of the first leg. 22 are entered. Of that exemper corry ever to the next elabor follow them do not fleigh and over to the third station, - 60p



Typical of the job andgement perwhen is that of "Station 1642," walth in it yees, or the average on the int los of the line. As Inted in the hi d Precedure Manual they are: I Man Bean Rierings-Continued Organi & men ever seconypolies ship the Syciem 1642 end freichen rapping

a few had in 1861. (All surface over ed and coolant shetfer cable avitame









INIATION, September, 1942





Cornection, is the largest and most powerful mass production simpline as Navy service. B F. Goodrick equipment below the Coronado perform its vital make with greater

select and efficiency De-Icers, for example, crack of danpercent for when it forms on wing and till perfects. And in the work of burtle, B. F. Goodrach Bullet-Seating Fuel-Cells out the hazard of garoline leakage and explosion. To the men who fir there, a nangon's practs and gratirade. To the place most, a calum, and our nomination as

"Plane of the Moreh."

In was or peace FIRST IN RUBBER

## Hiration industry



A bole shown as right. . . a slag ribeing out through a fighter relate's fael tank. And

this is read bale-relled a "Acases" by each from so a fighter rider's life if it had been made just a few years non. For then, excellent would have powered through ... invited .... Yorkey h's difference with our planes at least One.

bloom all over their extends surfaces ... but the bullet. sealone emile tienne bolds On this "laside lining" hongs a sale . . . a story of large part to writing Is starts back in World War I when engineers from anomand as make fact rooks self-sentiar. Some trivial recress was achieved by crarrier the sature of a combine such with subbancompounds and then covering the rubber with a presentive layer of leather. But as the power of guaare increased, the county covering method box on effectiveness. Bullets massing thought would force con maged "flowers" on the exis side and rip off

reservoirs can take is. They can be pierced by 50's, man comments used today. The schematic drawings 50's, even 20-mm cannon shells ... "Mawees" can so the appears page show why the inside laws works where the outside covering failed. mide. Our engineers have done entensive work # compounding improved scalage materials. They have morelied formers and scalars that function said special forms on which so build feel tacks, which can be made up in all of the urest variety of complex shapes required. They developed synthetic rubby molded connections and effective adherings for att as feet-cell constructions. They constructed telllarge sections of the covering-making self-scaling sealing hose to assure safe tracomission of the full from the feel tank to the airplane's engines.

B. F. Goodrich engineers were first to work out a neurical solution to this "fewering" trablem They

Each a resk annual of courries is and in so drive

MAKERS OF B. F. GOODRICH TIESS AND OVER ED EUSESE AND SYNTHETIC SUSSES PRODUCTS FOR ALSOLANSS

#### Firing tests prove fuel cells can take it **BEFORE THEY TAKE OFF!**



Every combot condition is simulated in these tests ...

Markons and Bullion-book Mile and Mileyear made a filled with manager. Show after show is convered seen them from all angles to see bow week they can take without leakane ar exploding Bullets are even recochemed into the tacks to significan deflection from a street. propeller or same other part of the plane under fire. And these tests prove that tanks with B. F. Goodrich bulks sealing insens can about the service punishment accessory to bring our planes back after sky bunks against averabelming odds

How "flowering" was licked with B. F. Goodrich bullet-seeling inserts



The two achieves cross section drawings above show when happens when high-power bullets pages the sid-tape covered tank and the modern "listed" tank. Bullet easers at (A) faccus congrises from side of rank, then coverding self-realizes there. At (%) the percific force causes the metal as flower. off the names Observate vesting in approaching in the six raths arrived the metal tank and prevents repression. At (B) pressure again holds the satter tight against the tank, that the built makes a cleaser hole to more, and the flowering,

briog ognide, is harmless.



In war or peace

**BEGoodrich** 

FIRST IN RUBBER



#### I. De tuers are boated on . . . a. The leadest often of warr and tall perform.

b. Curburetor sir intakes. c. Wirelshalds.

2. De-teen are made at . . . a Chromo-terrant ethicir-

e. Specially reflect \$5, come showings allow.

3. Each De-four contains . . .

s. Control tale area floriest on ton and better b. An electric heating unit encased in rubber

c. Perforated layers of metal-reinforced leather. 4. On-loan are operated by . . .

a Super-heated oil at 10 lb, ser so, in internal

e. Alcohol and earbon teteschloride.

S. A De-Jeer's trabes pulsate in order to . . . a. Keen rubber from freezing. o. Crack off ice after it forces.

6. Attendocum fairles strips are used in De-foor bea. To deale static electricate from the Loss markets

set as a washer strip for the attachment acrews.

This is one of a series of mannionance quitare persuand for around core treasures of the U. S. Army Air Forces Technical Traceang Command. It is our hope that this series will help all maintenance men get meximum our vice, refety, and efficiency from redstory, commercial, and civilian aviation equipment

E. F. COODEICH, AERONAUTICAL REVISION, AKRON D.

7. De-teers are attached with . . .

a. However, and arreses c. Sout rate.

6. Metal and street are used by . . .

b Prevent endrose creep or movement of the

c. To restrict take inflation 9. The outer surface of De-tuers is covered with a

special conductive coating which . . . a Sale up automorpatar service b Bleeds off static charges that might come natur-

10. The room of small rest below in the ton and butteen elactic areas are placed there to . . . s. True wine begins greating.

keeping the defiated De-Lor tight against the

FIRST IN RUBBER

by said of operating real. With the idea on a starting roles. STATION, September, 1945

Design Approach For Long Range Aircraft

Part I

best ratio Ht of payload to total

BY ROBBET Y. BONAMB. Annua from Service setted leading to the optimum combination of values — to be advent to when and never leadings and other acceduances where ateristics -- on airpiese intended for long range service.

the first stee should be to taske a thoron complicated in accounties, it sold seem efficiently to elarify as much hest trues of service to consider. a possible the saterdependence of the whether for irrangeri of campo alone, dies range streets. There follows on or notime of a method which will and to the optimize combination of Such factors, together with the probthe to be entired to some budgers. able schedule of finter, wanted indicate to consider and markle the second of undrance characteristics, in the dethe secre time satisfee the overest time Anort from fundamental denses oug-t plane to be considered. Again trees topposperso useds our times design, some operators would

chicus which would dissipate or at The correct is, first, that we shall wither the problem from a comreigh, that is business, event of view and ly all we brey or would like to or cloud are eastler wouth Price.

is property of Lancemon, such as the

secon, to 300,000.Th. Sving boats of-

-sit under counteration, justifier and

mands some defeate solution to the

it the respect It to curbana meets

titte unundere, when he have a muin is progetime economy, people and used premarily to be prefitable from the peac of view of the operator. offer shoot the decision interest Mercine only as they are frame. ed so, terms of meful had survival

ing with its verperties coefficients of These different methods are all more one familiar with the prestonal field of derves a green record and for conden

ments of energyful suggestion, such as for normal carry land, etc -- determine those ever weight. The best solution ate with the imbanes of the second "openent gross weight", the velas Furthernoon, since strengt techniques which would offer the best rates of purhood in total transace. Others total, we can rafely assume that an expicts thick of efficiency in terms of untersed technique, aware of the

trends, will have an difficulty in cuttmeting within a rafe marrie of error ing a specified period over a given become Others findly made and therefore unous reseasable to world choose the best solution on the shoose the green wright as a uredetermenable been for the design of the shire to be both. What they become the prescripal factors involved; Green propertiess-and this is the main abject



The above taking off in the arms former meet of the world's largey trade will be carried by hour from locat.

core that the severalt of such green weight as may be assigned, will, spece considerate, he able to corry at least should be raited that this result can be obtained even when some error the gross weight. It is indeed known in mathematics that a function varies but dightly in the prophertood of the maximum, so that even if we consider weight, the opper which may have been made relation to the continues rains of this latter, will not supportably afford the maximum purioed in which we are Let us also add in answer to the obsection which rought be axised that speed

basic factors slower with cross works that the wethed we propose also forlebear whatever compromer colubins Having these dryroe considerations es seized me one some embestation to their ten which will affeed the optimize value for the disposable load, represented of corne la De current difference letures the even weath on the our hand and the weight of the pleas streeters

and arresonry feel on the other Such is the remained method of the weeks which up will first expose in a second way outlining the thousand sensets involved and then arrely to a samerie exacuple, closury with a discus-The new element is one ruethed oneseds in the propriate of the system of equation which govern flight condi-

structured wright, and solvens them on as to obtain the necessary obspectoristics for an eptawam deposable load, as We shall introduce and equation with an autime of the conditions governing st. I The first asserting is based on the

sected by Louis Bougust in 1927,' on the best of the arridometer theorem of the French prientlet Batean E-803 6 3 legs ( W-W where R is the range in statute males.

by colm air

c the excress appoint find concepts. W and We the gross weight of the (1) Commerciation in the Ferral Academy of Principles of the Period Academy

Fig. 1. Hossestry feel lead F, to, minimum paraste drug coefficient Cp. for defence reg. 1. marriagy race

bood of, the magnegos value of L/D

will ansayone from now on that the please

error and that all design characteria-

tire will be suberdusted in that condi-

theoretically, that if the fight m se-

complained at a cities ablitude the

of the grow weight, which of copyer di-

munches with the consemption of feel,

that, nader the came conditions, the

rance will also be darrelly proportional

to the ratio of the reconflier efficiency to the specific first communition, and to

the weights petro E'/H'-H's, which

takes into expendention the first find

on the structural qualities of the passe.

ance, correlate in the desire of load

reasy appreals, of choosing each of the

respondent parts with the atmost care

and of sources a reselve adaptation of

the overall powerstant efficiency to percolamente chempeteristans best sauted

The above formula, applicable only

when from it in calm are, should now

be extended to meet the case of Sight

most difficult aspect of the problem

to severe conditions of flight

Marrower the above femorals shows

Dis mean, as eas he could moved

It should be boys so mand however, age speed F. and with a feel had F that this equation is drawn up on the countest, thet is, that the flight be made tion that, other things being road the positive and augustre signs price reasistant range or maximum partend

Thus, wines R - F. C. Com V. + 1 - V In other words, assuming that the place maintains the name average speed ship should have in calm our is only

to be able to cover a distance E, speed speed F. remains the same in cule sir we house, it is advantageous rather to tespense or decrease, respectively, the

surposed by an assumed which can be mathematically determined for figh with headered or tailwind in the final form on follows: com. Fr - sees 4. 7

Per ( V V V ) D. As a second constant in the creek able for tending speed

to the case of the maximum value after Because of the appreciable dorses on cross world modified from the law questity of find command on a nemal long range Right, it is advantaged. AVIATION, Seconder, 286 abre healing with this type of pteas. to hear the broken speed on a spoon weight figure inferior to the take off engts by a certain fraction 1/F of the manipulate first lead. One-third to have to perform on short route. That for the place with the peoper souldand for weakly downers the spenfed second of find in the event of a forced Using the preceding notations, the resad equation may then be written ANDRO- C. Com - S. Fr-W-W- CO a which since hardrag speed is not

III. The Oriest equation in hered on the shows, but it is excelled this time to the men green weight and the overage air-If we consider the mean gross weight the same pointing, this equation may he webben

CORRE A . CAL S TANK TO CO (Co refere messly to the equitor lift The choice of W - W-/2 as mean grees weight gary seem somewhat arbitakent, it would seem that the chestons 5-2,500

447.750

AVI - PTON, September, 1943

TABLE ! -- Tradeof Comparisons Tube tower since according to the comblered performance of full room would with

the engine inoperative and only a nerexemplice is normally greater in the vided by the others, should be the restoriou for total rated power needed et destination with a certain reserve of be assumption sufficiently assurete. shall define maximum power, then, or the beam of the type of absormal climbing confider. For fiving hosts required maximum power. For certain the amountain take off some will comfittion the takeoff so that were named he wards sufficient to take care of the entired house speed condition and retain acrodynamic characteristics demand of whichever value is the highest. my other time But for most land planes, and even madern from boats, rate of climb a is received at full gross weight, with only a swite p per cost of the total noted power (BUR)

 $\alpha = \frac{10000}{\pi} \left( \frac{\rho}{100} - \eta - 1011 - \frac{\rho}{\pi} \right)$ · Car 3 · T.J) \_\_\_\_ In the purceibnia, the first term refers to the available mover and the second (where F., and Co., soy the rate of climb is reached when the nin-Case wiff he equal to the employer drug ٠ coefficient Con and For equal to the value of F., calculated by expansion (3) for the gross weight W. Capried of II - W

The above equation then become: - - 2000 (fa + 107 - 4 00 - 5 - Gr - 8 - F2 ) 10 Before takent up the regation for

evallable. The well-brown constitut of

pate of chush may then be written as

mental poletica, peculiar to firing et maximum L/D, emphiles oud than per-





Fig. 3. Required wirtness expect ratio  $K_{\rm c}$  vs. maximum parasite ding coefficient  $C_{\rm co}$  for deferror many areas  $\tilde{C}_{\rm c}$ 

contem ment be selved. The known redian regardent. fastors sen be druded into two cate-If we call Co. and Co. the lift and dean coefficient, respectively, the noise ments and flow formshot by general success date. We shall bet them in is known that for the polar posst of teem as follows: maximum L/D they can be expressed (A) Known factors given by operanarrance dear C., and effective aspect

rains of the total simplese R., by the Pleas's size and fall gross weight W (from the general operation requirefollowing formals: vents and the necessary accommoda-Committee Co Cor = 3 C ... copper

rea he remained as surreafly housed up, or exceptionally damped, before of right a, when cells a percent of the total untel server is acceleble and ofter takend at full grown weight, one earing bean completely mapping ve-Normal sons of altitudes at which the (deponding upon the technical stead-

Assess consider efficiency a for average specific feel concompany of the latter being those for which the

num lift coefficient Come (depending There remain to be found the outmy makeove fundamental characterjoins of the design: Worse area & which shall ever the wing leading Total rated BHP which given power leading W/SHP and, underectly, the Avenue regions used F. and Dr. seconsty feel land E', correspondent

It should be remembered that the numbers will be subset with the size or used of finding the lewest possible value for the total W. + W. of the structural and fact weights. The following procedure communicathe motestry steps to follow is alter. ing the solution: 1 Amira a certain wander of arbitrary values to W., such an W., W., W., W. shows of severe within managed inur find the corresponding values for

the wang area &. 2. In the same way assign processile, arbitrary namerical values to C., such as p., p., p., p. Sobetheing them in gother with the different conditionance of values aboutly found for We and & we can solve constants (1) and (1) for the corresponding values of experi ratio R, and average renicing speed 3 Three first pendits our then be ranged up in a table (seek as our ascompanyone Table II. They slee wale

it mouthly for on to draw such family 4. Equation (4) enables as then to fed the corresponding values for the accesand from which will also be drawn a The west step consists in Section. serves the infeste semina of conducts

been of the possible robutions affected mor variable, it would seem herical to represent the lorse in terms of that draw coefficient will for a circum were

tielly a fuertion of the power arrent-Thus, if an estmade of this coefficient in worked out for delivered Narreal value to be savigued for mate. combinations of power and equipment AVIATION, September, 1943 AVIATION, September, 1948

notice of these lines with the energy of the corresponding wing area pencementic drag pertaining to such conmante of the descret loans which saw then be propresented for a curve, such m drawn on Fig. 5. The remainder of our problem our or he solved by Status the values of

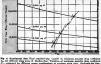
wing street, we shall be able to proceand the variations by detted lines, such

the corresponding weight quantities T. + We and expressing their variaton lor a guree, such as that shown on Fig. 6, for the numerical example. Dis success will obviously determine the unitaries value to ration for the wine es. In actual practice, however, the ulu, most closely approaching their monage, for which a possible engine own, all the other main dearen share In comparing the weights as well as to difference in purhood pertaining to te possible assistion, it should be noted twited as a senstant, since, with the ecommodations, at does not wany like for other preciables of the precised to will remove correction only with fices parts of the sirplane other than

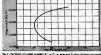
Every aircraft manufacturer has for pier the coefficients best educated to in type of construction. In order to have the study complete, however, we thall include here on example of such a If we provider the standard street ter of a modern, all motal, eastdorrer for, we are that the weight can be briled into two components; One the rought of the enternal covering, proreturned. therefore to the wine area: be other, the weight of the stressed the standard and billiand mode to

ion, upon the lead factor, the wine bular, and aspect rates, Law of moments deducte to priter with the theories of rimple stress majors, show that, with a fair awarenibelies, the stressed ciracture weight on be expressed in the following form: 4. X . por . 4 57 . 4 . W. 607

A being a coefficient of posperticuali topening mandy upon the load faster (Turn to mate 200)







#### Curtiss Antosynchronizes Engines ... Eases Pilot's Job

By GEORGE W. RRADY Chal Espiror, and Project Engineer in Charge of Propolitor Contrals.

Multi-segine craft pilots no longer need bother with periodic timetaking adjectments of constant-speed propeller controls. The "proportional" synthrosizer does the work for them. Here's hew . . .





A tum you colomatic syndroscotics V of carrier or melfi-miles asraft-to relieve the pilot or fight ragineer of persons edjectments of our stant speed propeller controls—has long hom recovered. And now, in the ortelograms of the Curies Automatic France Street Streetwares such are chaustration has became a reality. Already is operation on the Novy Consultated PEGY arrest of potent please, the type of routed equipment. med with Curtiss electric propellers. both agreemently appropriates the The synchronous, now in value sendentes stone from a progress tall-Woold Propeller Devotes in New fore-engine synchronises system nor has now been experneded by the inproved "Proportional" type.

The stator was recented on bearings. referred to as the "Early" type. The in he ship to switch through a small After extensive laboratory and todsteed work, the first "Early" type unt was installed and form on a Nary Scienty VPRG for same print where in January, 1839. This coup-Costies electric propellers—the more band as weed with standard covered control—in such a magner on to obtain ten. Is ediffice, the device compared gree, personal units of which are shown becomet in Front 1 and 2 The master wait, which was restable

tacker cects monated on the segme per reports these features, a major reby the governor drive. The states danger was andresished as the second vindage were connected to the obe-

nater of the master unit.

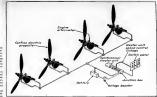


Fig. 3. Typical Installation of new "Proportional" type synchronism (now in production) on a four-region similars.

Or agreed a purior, the depresant of ry of the alternation current from the water unit. Contact points were invalled in the head of the contactor so cuts to the relay weald be closed as the states pireled in response to speed In turn, the relay controlled the ritch of the propeller so as to make occreetion that would symphopsies the entites to the smeet of the master rait

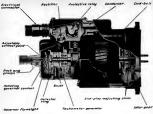
of engines was entoughten'ty ob-Flight tests proved that the graters d vycebronizing all engines to a "refe constant meed marry was but want and generally satisfactory. Howthe treather with convers lest stend meaning to obtain econsteatly the eq-

esp is the emphysizer development pagnus. Sought were AVIATION. Replector, 1967 AVIATION, Sectember, 2043.



Fig. 4. Native said (major major) and conserved; contrast in Proportical course 1. Retrofon of the constant-speed contactor unit is the master unit to as to remove these elements from the hat with an improvement is order serves vikinges of the regions.

to maintain presue condest raced under the load and voltage varieties 2. Incorporation of the sousities control elements of the engine-monated of trair expelyropous characteristics 5. Achievement of trady symplecture operation without handuar or save-



titler gear

Ho. E. Salveri Cutavez sketch of master motor assembly . . . Phy. E. (below) Schemetic diagram of its works; .Productive relay Protective raley\_ contact assatz Condenser 8 ---Starting field windings -Register Gendenser A central shaff -

Brush

Advertable governor contact

speed setting. everbronner system at least opportbut to the weight of the conventional dudge the province emissis in the

Marged within a certain report of

to meet all these requirements, was behamber feeted to 1999 and 1984 with per adulator resilts. The course ned was first fown in Supt. 1993, on is the Nery Consolidated XPROV. 2 in December, 1946 Encourage of Chara installations seculted - shortion of this new states on twobetween Consolidated PROV-3 planes gal on the Booing XPRB-1 paired banker Other leate/lettors on bring wade on neveral new models of sarplanes of both fighter and bomber dames Service experience obtained water it armose werbable that eventually there will be general adoption of is all fear-engine and many lymen. stne planes. It has been bearned from experience

that the resistations of the new connest one translation of the new poscomplex then that of the streetest own significanced generator system. This is as lesson the mechanical connections penmily remired with individual constant-Engly of the armsbrunger irotally. to the standard governor motalliston. Fig. 3 (Codgates the testalistics of the The master symphesister and shows

in Fig. 4 is comprised of the master neter a corpled with contactor under à One of the latter in provided for such cardina. English smooth in letterwaver from these phase shirmators, one of which is mounted on each stofire, totally on the recovery frice rad-The polet, and in some installations slee the flight regenery, in provided with marrefunal recorder autobes to aleffor to a master unit united, master tall maled knob, and a technicaler to sail to operating, The master mater, a nectional view of which is shown as Fire & is a manner

be conveticed governor controlled

for motor in that the personal con-

ATTATION, September, 1943

tace set on a very sensitive control

unele.

AVIATION, September, 862

of of intable content areas, more presentation, do, motor which opersin dreedy from the sirplane's roll. Electro, this motor is different from



metalled either in corkpit or on flight engineer's panel.

This operates in such a way that is Oversor contacts are placed across one of two commend sections of the control field, with the recell that when the enginees are open the rentral field count up. Conversely, when the contests above the control field becomes

The seties takes where at a bush frequency when the motor is regularmethods, due to the extremely small usered deferential research to cause the ceasing and closers action. The rem at which the master motor regulates in of the regulative sentents by moore of eather a lever or feathle shaft tree marked Maximum and minimum stee motor for solver the deared taken! and ministers operating speeds morroug produces a substant rolling.

which is used for operation of a pro-

testive relay execut, as shown in the

marter motor water decrees. For 6.

event the master motor first to operate at the regulated speed because the master switch, or other cannot, the relay will open and the propellers will remain in fixed outsh at whotever much tion they were operating at the time

A streen tol-light in usually possided, amerated by the cretario on the new testire relay, to indicate when the master motor in operating outsides turity. On some restallations it has been found desirable to correct Oil tel-light through the automatic position the womether selector contab. in ersh propeller to indicate not only that the master motor is operating setts facturnly but also to show that the wee poller selector switches have been placed

The master maker also incorporates a small permanent magnet-type alterenter to operate the tachometer (distrated in Fig. 7) which is installed either in the cockrit or on the field engager's parel to indicate the man-

This technicater commisses a counter



#### En. A. Seetles, where all evertageer derive showing the synchronote mone and thelers) consume assembly with relay possin.



tion to the retailing magnetic field way

- Resistan

upont of the marter motor (con- 100), unless spersted manually by the tester speed) and the speed of the or- religit switches. This is accomplished rise. When the volor exect is non. It providing the contactor relay eigwith both the master motor and the oth through the protective relay conregime running, the two are said to last. Then no operation of the son-The rotor of the symphosomes model is used to drive a contact mechanism holden, and direction agention materi. The brush holder is rectrained from the pro-ermor pad, is a simple parentlaterrapter relay is energical directy of. The mountage and and spined through the break holder, and the our tire are the same as normally used on meleter contact mechanism server in the conventional provenor. Output of interrupt the should to the propose of the shounder, as portunally mentioned, while increasing further paid and to drive the small much received.

voltanter type instrument, coolering a 278-day printer surrenest for convenience in reading. The unit is speciated from a bridge-type recities circuit and a referenced curr transfrener that is excited from the energy Varietance as miliary cetted in the permanent magnet alternator do not affect the technologies californias la come of the action obtained from the moree and allement confidenced of either one or two turbometers, in in-The tachemeter is calibrated to could directly in organe rpm, after probus-

report rees, the techometer did to provided with a red marker which may pure through the direction contacts.

personally express to the pro-

came of being in exact synchroness. "Siecto unit cton when a custact is being made The propeller relay is also energical place switches, tachometer, control The propeller relay is also energised and switches, techemeter, control by the brush and commutator mother had, and tel-light for a four-engine in-AVIATION, Sectionles, 184 STATION, September, 1845

Se. 18. Exterior taboret and excen secthe name (right) of engine olternator.

The envisore mate. Destroyed in stone is Fig. 9. Tomodelay change. certain to For. 3, were to compare the betefor of both the procedly relay and speed of the engine, which such per- the interruptor relay are as adjusted named and communicated that of the ... It meters of named other recontract and master motor. They also provide the embrance. come the prevedler to either increase it finally the time interval between

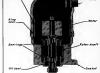
or decrease petch by the amount that | meeters to the propeller is reduced to Ea) eight contacts per revolution of chronous motor, a contact mechanics, is obtained at approximately 60 rese. and 60 rows, off-armed for the percention tor is electrically driven by the eller, former and promain rom, expressions. nator on the engine and has both in To prevent the time-delive action of status and roter mounted on bull bear. In man propeller relay from afferting the marter motor, in the opposite direction. This was most successably ine with a rectifier (Fig. 9 deced in the stator by the ellowater. As elevady position out, if for any The resultant relation of the room is been the master mater is not overed. therefore proportional to the different [10] of the speed for which it has been arout between the correlators of the propellers will remain in fined

earler mater operation is also affected. Linearing and of the system is the none alternator shown to Fig. 30 Strawt equily mented on the selest magnet-type three-phase alterna-

A typical arrangement of the pro-

change correction should the roter, le- "the which to an integral part of the

dallation including fact fastberies in



bown in Fig. 11. As an alternate in "Automobie" position. Desired engine secol is obtained by adjusting the manhar the cettors of the master sail, wenection is sodiested by the master movision is made for a pask rod connection from a quadrent in the contrit. tor tacksmeter. Operation of one or Operation of the propoller soutrols more propellers in final nitch or feewith the automatic available available available thered, does and interfere with the is already. The receipt well switch recraise of other propellers set for manh of course, he "'On" with the year, estimatic courtest great

pellor selector existing about in the



Fig. 11. Steprem of typical switch panel for a fear-engine contalistion.



Fragetier rates

Properties rate

techfier ....

#### The Case for the Integral Power Plant to proper preading on the job.

With a force consense of industry landers and service men accord-

ise his critical medium, the outher comments his applier proposeds for integral and standardized sylution newer plants.

If my on agreemen two related up L times First, thei aviation power plants, navorally when they include tay, units, completely self-contained; and serptone assembly, all power plant mounts and all place structure cunports for power pleas mounts be standrefront only to for or connection to each other to concerned Then for each tone and the home

power of sirplene assembly, different namer whenty will be inturbunesable on a given place, or a given place con microhangeably me different power

In accordance with the interest when an existing power plent would be built

Pro, "Middle," and Con courses on the similared names pleat species are effered in the french two-part series. Incinded

A. Karrena, short malacer, Benedike Acceptant, 19 J. Camerow Worse, Jr., provident, Falo-

Rosery Winners, Continued Avades. Courses W. Mesen, Albertach Mis.

C. A. Staw, engineer, Chrysler Corp. KINSAL PLECIES, NoDonell Alexand Loren E. Basers, Eigher Rody Dornell Ove. Genera C. Grove, AAF Misseid P. Hans, cheef development cogineer,

turn the front section of a mostle or never plant mercalists work may the amenably of engines, tarbe-BY TANEDED A MOSS MIR II D Countries Engineer, Separatorper Sequencing Dir., Garanti Stacking Co. (day groups of serodynamic specialworld, in purallel, peopure the on we to, and imbuliant, the oben-

out afterward would be atterbed. A well night be a part of the powerbut section, with the various accouour holied on both sides of it. Signaturelised Power Pinets agent power plants would read in d threscotor to a standardised namencal to that any plane of a es recently type would take our on families takes about these and on their an American interest or wheat would fit a Reitlah where vice versa. Of course, there would on to be standards for mount

> Tie 11 est Detroit specting of the lot with rade two and a if odwars of publication of is sed discussion. We now ir a fell and improved poofor of the plans invelore ther of emissed engancers.

their operators below added to those of invated forward, belonce our only by the eather in order to one a remolete attained by morning the wing on far forward on the sarctone that the print The situation with respect to single code wing structure passes through the come bless is recorded by A. Euch. vell, elsef orgineer, Republic Avaidon "If any serious allowed in made to develop the integral power plant idea.

plents are frankle in the case of fairly circula installations, norm on those reto be of sufficient advantage to more velving unespeccharged or single-stage expercharged augmen. It is also wonable that as integral power plant rould It is to be borne in mind that Kart. be desarred, for two-stage or turboveli is reconserved reads enters planes. supercharged engines, which would be First it years he harved that wave will be estudartory en large multi-engles sinfound to salve his problems reference to be or contracted and the contract of the contract The course prepositions promoted ever, that an interval installation hahere have for your time found setual volving a large and completed power employment in England. A report shout this was made by J. Carling parent type simplenes without making Ward, Jr., president of the Fairchild serves serifice in the perferences or Regine & Airplane Corp., who was a other westition of the stretames," Kartech has written out in detail a neater of difference with an interest power plant with such single-region

land We market We now attroofed enginee going into fahire and board model carine buts planer and he applicable bowhere We say applease that could "Three there is the assetton of bultake either liquid or serveded engines. nore. The prior should be beneful forin other words, we now the 'power ogg' be near the C.O. With all the walche

power installation wherein the engine plots until the power plant is so placed in the sirplane that it one give a resonant thrust J. E. Eller, an English owns. neer of Rolls-Horse, Ltd., Decby. England, and who new in representing Rolls-Roove with

ires, has had actual experience "A number of years ago, ongive besiders realized the many (Ture to mare 201)





Fig. 1. Schematic diagram of standardized moves bosen for brought power plant. See . L. Bay) "Power orga" produced by the Exical Asteplane proposed for standardization are location and design of mount bosses for both plant and Exical Conference or an extension of the plant of t Morins XX and good on the Loncouter I bumber. Plu. 4. triple! First organization's meekup of gription integral power plant with





fee control of the micross at high abitation, the raider resquant. levery with run centered bales. New Guides to High-Altitude Rubbers'

a prantable committeery is more tax By LT. COMDR. HARRY J. MARK, U. S. N. R., end STANIES S POSSET room, could be assented network robber Revent of Assessments, New Separtment

Broad seeds for cold-resistent electics in aircraft are sparking the development of more assurate testing methods — and they are nice accepting the demends for a more practical terminology.

founded in the righter and righter arrest amount of conferring terminality. problems, each of which is itself offers wars been stelled by the aircraft mannapportunity for proteion and confiafactorer Its softens and ability to name. Because of these substreet endoces. watter the effect countries. There terms moddens are the tade flying, for rather or rather-like 2 Efficiention through practical money of creds rebler to be famorie knew & and the nee of rebuitation with

traces. As blesses for higher, the terrprocess and house. The address of her raider to freeze. Also because of the eventer ared aroun for the makifurness No we have a year of the send her sace derivate very sharply. Moreover, Enroque Lorie (Manuel and Depresenta-tions in this spring one libers of the multi-re-sult affects and he suspicions to sedeviles (for Manuel China of the Santas of Artistics. greater somer and claubing speed pro-

torough fraudies, is been strailly y What is commonly termed "craftes Iranwach as we do not know and Scally, Actually, the thing we call to tota rubben. There are a great rape of substruce rabbers some of what are flow or yield under pressure have made concrebet sender, chemically and unirularly, to rabber and whose physics dealers with bread new materialscoom of them rather than one No of the materials are identical but to nergeletary meaning they managed under dell'errait names. Patrate errait neces, coeffeing, and conferent At some future time it is alonged !

AVIATION, September, 1872 ATTATION, September, 1842

makeance in rubber to reroot the materials engineer to arrive at his phista man is the designation of that our he or characteristic of a politica on whiter substitute for marginizer shately, faribility, and recovery sentures without cracking or dohe or robber sobstitute reater fiat permets their being bent. Abli-

performance to be suffices. When a favority is enceeded, the runtotal develops cracks which are marrier sailed "for shocks" the stock becomes cobler and steller. 2 is more prome to firs electing, and met is considered to have fasted when, some orficiently still to shock when askurded to a spended test The problem of cold problems conat a both albitude plane. We war first of all eliminate those parts that adv so effected by complete weather conditions. There are also a great many more

of religer, where its manuscribes of flexiof its additional A common cannaghof the in a secretary majort to which a lever of rubber in ursued tiebtly helesen two layers of absumms or other noted so as to secure as air tight do ten out, under say temperature confi-



No. 3. Stone are two Shore dar where the case on the left becar for hand. nee derham very sherjie. Moreover, and terminality in such a ver state greater power and distincting speed per-pender power and distincting speed per-chamination of the common of a temperature. Handoners went materials site the problem of delicining of the per-turbation of a common of a comm who number withration or flexture will not Tolay, a great many material specifi-

entions are being written which are cold-contrast compound in a dormust test buy. Cold flow reporting are vary often abtenced in conporndier at the sociles of when desirable characteristics perhaps residence to fume, marches, or war number of other things to a Afteritor is not equificant Atide from the number of cubexisting between the veriess types of righter exhautation, we have it problem of compounding, 1f, for evenue un coniche House Non the bill of materials, we have then

ferror point, a 68 discounter stock (nample seets record by used about with the house A) becomes perious after as hour, while a rubber substitute before we achieve the stock with a room removement relation of 11 description of the later which the finished product. The weather from and amount of those incredients is the er to eliminate the possibility of enachresplicate material. This and of comprending comprises a very highly successful field about which the grayage turbana bradiur a bolt. We are conperson only with those rather party whose investent ability is to etay sell-Year often a commonad meet be made for a decilerty of pargirements, such as and Sorida under all conditions The term "cold flow" is very aften for a cold scadeline in a hodreelle of ministen as being a measurement of The materials engineer about out up the storoved propagaments which must be rect and then let the publicy specialists further from the truth. Cold flow is ore were familiar with one true of submight be reministered a tendency to date stitute then another, and there is an

characteristics of public under cold confi-

from With 22 decemeter as a theoretical

the "Compression of I settles then salted to work with these specific mate. mak with which they are best accounted ed Generally, they are in a favorable that quality. American aircraft manufacturers. position to tell which of the continues some of them only reknowledy are When setting furth the properties of profiting very mark from the report. a relier or a robber asterilate for sold Front, weath colder ground townsend town operation, speculy a stack which as on saft as possible, in order to offer the presient monthly lateraly before a however, that planes now under con-struction in this country are designed to the in altitudes whose subhane of our

without monument

from his also brought to our attention snother very leterating freeze resist While under vibration or finder meh as is setted flight conditions, rubher and collect substitutes do not in erouse in handson and as much as when they are permitted to remain

Fig. 6. The are test, completing bendus



tellested the here of the material

person why they should not be per-

Hawrer, a variety of other bounds



No. 5. Greater speed of determination of Green resistance in robber as provided by Ng. E. Greater speed of determination of trees resistance in reboar is present to the Sourt T.M. warr. Operator Min bankbod hid thus) and inserts public sample in undertable task holding bands reliagrant, then takes broperation readings on theretometer eveighte made heading highed settaperant, then taken brooperations tradition on thereforeter true left). A digramming is used to measure hardness after cample is reduced to describ tempera-

crashes a degree of hurdares which model made of assertifications for deopher of 50 deremater, arbitrarile speaking, is the nextices: becomes the der which the and as which it is were possible will operate activizationly, sail named which it might be difficult to the francounted. By projectrabber, at your temperature, to be 36 or 55 december, a material that will readily obtainable than If Th doron our

constitution is very often excluded Another excellent reason for keeping the starting point as low as possible lies in the fact that rebber is made on that are extremely unacceptible to emporation under a best confitue Should there planficture be lost the Makhar and makhar ministrate on mi

(Turn to page 388)



#### For quicker, easier engine starting REGARDLESS OF MAGNETO SPEED

From the Alestians to the Sabern-or almost any temperature this new G.E starting albertice easy espring starting. A nedesting low-voltage carrent is applied direct to the low-contract wind. the of the magneto, and is atmosph on by transformer action within the minmete to remain a high-voltage output, recording of him marreto bettery-convent drain is low, and radio interference is almost correletaly eliminated. The vibrafor operates only during the storing cycle; it is

Stordy construction, External parts are theroughly protected assumt corroson. A platedsteel case provides durability and strength. Coils ere embedded in a specially developed, highmeltine week, moisture-constant mealway con-Highly efficient. Power losses are minimized,

pound. The vibrator is protected

by a special relay against inthe rearnets General Plea-

RPROVE AIRCRAFT ELECTRIC SYSTEMS WITH THESE G-E TRANSFORMERS









#### The T&B WEDGE-ON

#### One Squeeze - and it's on for all Time





POR EVERY AIRCRAFT WIRING PROBLEM TAB HAS A FITTING ANSWER. THE THOMAS & BETTS CO.



THE ABOVE I, NEW PERSON

AVIATION, September, 36 STIATION, September, 1843

#### **Effect of Spinner and Cowl Entrance Combinations** On Engine Cooling

By JULIUS JOHAS Annual State of State

tuins of these setrence combinations has a marked effect on coaling aircooled engines. Here are some procifical suppositions, with writesiar errolants as unisser desire theory and effects

least. A few years ago when designers logen to here a room analytical apmuch howard the engine cooling probon taxonore believes in the system with more maddly attributed to the andrease rootly designed proprier over of country as to the meets of affects proteon of measuring and ourshow the prosures seveled, it was or would affect an almost 100 percent serves secondary Househow there as serutana were not realized, and the m-

or configuation, if in obvious that each view would be a copypromose with de-Let if be assumed that a representaer design condition was established. The sixture, an derived from the regime other recognizate, weekl determine te octuane scetion for any descrit of lever than 0.5 and not much leather to 47 To samplefy the problem, let

Want the effection of the armore

It accomplish to not entirely manuinternal energy does not follow hence it equation for charging even to-fan of the distance from the area releast response vill sary invenely with the distance from the name of rotaafterboly ecolumnics just in front, as well at in book, of the prometer is erastant for west installations, the rotaergy. The will recall in a decrease of For low roos, there as to Dr. will be an sare de-tributes which is beneficial for plotted against V./ND, where V.

N = propeller rgs axis, the househary layer sharestern-to-D = Average retrosco da, in feet of the very personn provery will be desirable to use this Y/ND us the during If it would be possible to develop a

The soul extreme motion haven to com infer which for the velocity renature, can be ecasidered as one purpos spon passeng the place of propeller ro totace will show no approximate recover-

in total necessite, particularly in high peed condition and also because the within the entrance discreter of the rafter relation. Her stream take has to remark into the entrance rection. beireductors of the spance who the enstant eliminated the probibilities both a new source of larger, which should be controlled. These looses are due to six top side. The spinner may be regulared so built up of an industr member of antota amond rachelly arrows the arrismen

of attack and all the other parameters consecutive considered. In normal flight efficie, paytientis can be approached on the brain of a

(Ture to page 206)

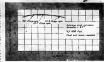


Fig. 1, Typical variation of personal recovery with F/NO



In handreds of control towers guarding America's form thousand males of skywas Wolleans chipmen on vital "reference points" for planes in flight, Pilots radio these moves for "the Kollsman"—the baroneme pressure senting shown by the station altimeter. The polot's own Kollsman altimeter is then set to correspond—a procedure visal m majoramine airway traffic flight levels, and in making safe landings. The first commen cist sensitive altimeters were products of Kellsman essearch-20 rimes more sensitive than then existing types. Since then on the enough and in the six, shey have become the second and of sufery and reliability in the covers





first step to building It26 near arctices at Consolidated Valenc's Say (Kepl<sup>®</sup> plants, other less minemedities are formed on individual man, in to assemble more service about to one disamentally stations

Under the enginal system, all those piece, car or each side. These are

WAT TOMOSPOWY ARE TRACED PROBLEMS he use do not yet know. Her my do know that in the ments will they a librar thant in their minimum and blase for broad medicar my know today Kelly better corests nativaments action will help union

plane for beyond anything we know today. Kells How Fesper Build More Bomber Nose Sections Peredox at Consolidated Velton Son Diego plants is explained by was achieved without vest increase in floor space.

> Other oxponents the scanler of burkers are now needed to turn of over 33 percent many B-26 Leberator bester fundame more sections at Conelitated Visites Appreh Corp.'s Sex. here picals due to an apparently or protection system. Same I'v the new system to this held the many markets about in station.

letter them together again.

Asharous this apparently socials resolt, however, was far frees over; for Beruly the serve center of the Leberstor- is a complicated business. Il estwin the one of almost 200,000 meets and ft, of wiring, 2,000 electrical and pleasethe commentance and more than 2000 O of believe. Tean this studder "breate" on all the controls needed by priot, so-priot.

me days far a every. To meet the new producting schoolsles weekl have pe nique break-down system plus special tealing—and production boost of a well lawr-for 200 fundace more would have to be in production at all Under the way solver, the sone see too shells—remarks from the year line Med in their stationary books on before with one exception. This involves leav fines, one on each side from freet to With the ness sectors held togethe

the more section at the name time and

mark offerentia at the same unit of con-

by helts at each and of these elegants "T have on before, ent them into foor when cake all the necessary instalable stades. A stew of feet was then tion to moving assembly laser, then mores two special rating jays tall

HE KOLLSMAN SO,000 FT, SINSITIVE ALTIMET inner! Capable of measuring alritude to mittin but a few

QUARE TI COMPANY

ATTATION, September 190 STATION, September, 1943

















After discountly, not panels per con down a clearup has so which river difficult to methods, as more than see completees could work efficiently in feedings poor. With present











#### Super-Aluminum Alloys For Aircraft Structures

P487 # KENNETH R. JACKMAN.

Assigned here is the vital importunce—as revealed by extensive research, of temperature of "time at temperature" is relates tensile and commercive circugits of shorts, extrusions, and rivots. Second of our special series for design and production engineers.

serve made by the CVAC laboracomplete and the increase in visid Lacine at See Diego es 2007 and strength was proportionately greater, olors, when exhibited to temperature to a cold-working wrooms before the aging or "cooking" treatment his varmose in terrals and community Insucash as CVAC developed, and rield strengths. The provinctations hat for some years used, the mentrees. chemomenan accounting for this valuincrease the weekstood numeries of of both temperature and time of frances. lars, many beam being measury to correlate the actor at MO day F while ina than one hour was resured at 400 Early tests were under at 550 and 560

der, P., Inganosch as the helding times temperatures above 500 day, F, were productivity of results, assessitated for ease of predection control, might poor. The medicinary spresignation also inated that the preripitation was more fixed with instarted work-hardward or

percent, it was decided in these earlier structurations to craftes the research principally to Abried 2457 so processed. product is "Airlad 24HT". Fig. 12 posand late the assessely accorded danie nations. The CVAC material designstion "Airland DEST" should not be some

fling and designated by the Alprium Co. of America as "Abrind 2455; 7" The best treatments of services shortly to be discussed were conducted ra large production tanks eveluings melten coding nitrate, and they we held at a evenient temperature of the

of 45 to 40 may. From the temporature they were quenched in cold water. The egung treatment consisted of mitore of 350 dag. F. (or 565 dag P. o learth of time. All material was a evelet from this temperature, sales otherwise noted. This aging process was neet andkan altrito and 50 percent potancium nitrate had at the descript ton corniers. More recent test spenses Standard § in tennile compose us meds from sheet or policy stiffness us

terial about had been recovered to

naterial at \$50 day, F. for 28 hs, newdated a 47,000 per, tourile yield; aging to 34 persons, upon protections ariemas. dranie besing mechan, ming an sale det for a marker period of 300 day. P. received until grant the property of the black property of 150 days. The results of their verying the in the black property of 150 days. The results of their verying the interest of the soft part of the property of 250 days. The results of the property of 250 days of the control of the statistics of the property of the control of the property of th

year corrienable for most aircraft detained by 115 he seeking at 350 day, I 64 hr. at 365 dag. F., or 64 hr. at 27 Fig. 14 shows the tame required to obtain the maximum tennic yield der P. The exper recently published h strength at several aging temperatures indicates a ricus rhack of the scotlar for 1857 Abled, Dalif Ablad, and CVAC findings in the 365 dec. P. tem. DARREY Alegal. The Lan personant way, perature reage. It is of interest to note ables, "less persiane" and "time of ten-TACOUNT Airied more of Fig. persiere," to obtain maximum yield 14 is based on heat-freehol 2690 Ables strengths as 245 allows, form a family of survey. However, it may be seen that the maximum tendle yield stress of 345T Abried "or received" sheet. would therefore appear legical that the

All con well, for 2007 Airland may be obset. The next-treated 1912 in second to perform a G011 in sheet coppose at the close aging had a issuelle pair sheet 2050 we reclared to 17 errors of 30,000 pc; stretching this may present after aging 10 for Agree the 64 period stretched melecular yellood the Cannot by aging the material for 20 hr. at 350 deg. F., 33 hr at 365 deg. F., or 64 hr. et 205 deg. F. tirial to a 25 percent set produces o as percet sirelabed statement proposed the cale visid electron of \$1,000 per, or a 3 singuism to 6 percent, a value still Likewise, the 68,500 per, maximum benefit wild stress for MRT may be ob-



Lackbert cover should be between the

CVAC NOT About and 16KT Ablai

Reset of sarying the aging temp

cerve throughout its length.





AVIATION, September, 1807

AVIATION, September, 184



Soviete in management time and material by use of Morrison Alecraft Metal Stitchers and U.S.S. American Aircraft Stitching Wire are rode amarine Hannalle bish-remile-errouth wire eives the required penetration in aluminum sheets and other metal parts. An especially developed and applied zinc coating protects against corresion. It is government approved for factoring many alecraft parts.

With the development of Morrison Aircraft Meral Scitchers, remarkably fast and economical application of this new wire has been achieved Actual man house were our owns 6605, on the few five applications converted to etiching or Curtiss-Wright. You can duplicate savings like these in your plant ... and you can do it whether you work

with Aluminum, Stainless Steel, Plaules, Cork. Rubber, Ashessos, Wood or Canvas, and are now riveting or welding any or all of these penduces. It will not you to write or wise soday for complete details and performance seconds excitable in Bellerin No. 6-F

## MORRISON STITCHERS



visits for a rises necessi we strately on this 2607 Ablad sheet, and that 22he aging con preduce no appreciably On Figs. 19 and 20 are plotted water.

caleiro property engres for no stretch. percent stratch (approximating 24ST as recoved"), 34 percent stratch, and 64 percent stretch (approximation) 285ET "as received"). It is interesting to note, on Fig. 19, that the yald Fig. 10 gives a similar est of excess 25kT Alched about straining alloy. electors in tention and conspectation on the "anstroteked" material were \$3,500 red, and \$4,760 next representative see coving SIRT Airied to MUTSRAS pm. differential throughout the 350 deep

versed from 105 percent in a 2 to-The 245 Aleted sheet that was stretched noted in For 19) that the mulad tensile yield stress rose to \$5,000 per, while the 29,500 mg. The two corres country areproached such other and maintained a 1,000 pei spread from 0 to 12 be of percent on a 2 in leasth after 2 br. of affeir was policed rapidly to 8 percent after 10 hr. The 34 percent stretched 365 Alched sheet indicated a commen-

P. P. P. (170) n 45.50 79,000 73,000 71,000 8109

rimichol at vamous untervals after test values obtained from commons structed \$ and \$ kr. after queech, and with very little order, it may be our mixed that the anged with which the Paints on Asian 205 Abuntana Aliana

sees yield of 43,000 pol, and a tensile

cerves paralleled mak other, separated

by 1.500 per. Elementum was probated

55,000 pm. The two excess acres non

periods Note how Ditte difference on

ack between tensile yield and oftensil

on the league-aged portions of the right

chart. The elemention in 2 is, on this

presents shanges may be noted between

The effect of varying the agong tow on the properties of 2007 Alele

to the accompanying Table III

alleled each other at the longer aging

In spolving laboratory findings on stoutching and aging 269 short and many important points which must be dde recedie are to be obtained. CVAC tests indicate that apprecai 105 105 MY -05 match & percent spring-back egats in

MAT Abdud about in above, on Por-

It is evolut from this chart that critical slapes of the legher aging standard procedure for acids at a serators below 376 dec. F. Thi re-Mr. /- P. + 50 dec. F for 0 to 50 is produce \$4575 Alded from \$457 to recover? Aleled appears to be a consposaine between the loan cor, with edecasts scatted, at 350 dec. and the aborter agong, with poor

blod, by aging at MS dog. P. or 5 dog. Asian of 245 Estensions Approved also materially benefit 240 ton effer extraction. Do 17 conte on a mary Alone No. 20159 extrusion Or black stationers were A in the test

shined got of the extraore on 3 learns for the "madwish" mothod totary. The tensile and compresses od strengths of "an recovered" 2477 spine at 350 day, P. for 74 kr. Tenand empressive visid strengths of percut ejectobed and aged extrarai and 60 percent, reconstructe as spece with "as received" extraspec. d Temperature Agins at 20072.

Beets of varying the percent permawith as the tracite properties of WEAVION, September, 1945



A SMALL PART IN VICTORY TODAY -- A BIG PART IN INDUSTRY TOMORROW



## over Burma or Berlin "Stainless" handles the tough jobs We see that it ments of war. York upperer then other stress in nacked to develop exceptional

sender send caused our as the only sender send that shell is own in the pensibing enhant systems of high-powered supplance, Date of these transless alloys the 'a being sweepersed on every subforce in Associo Stalakov. This is soly Associo Stalakov, most foresten Supple, red-date corrected in solid flying, red-date corrected to the control of the c

tages of Acacco Stainless Sorels too: ph
They form easily and can be fabeleated by the fast spot-welding passeers. The strongth-weight ratio is on the spot of the strongth-weight ratio is on explaintably high, No heat treatment

physical properties.

If you make planes or parts for the Albart also areadas — or if you are thisking of inture streament uses for metal—counter using Axanco Stalelas Strets. There is a grade for every

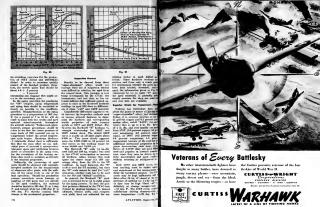


metal—censider uning Assaco Stainlou Streb. Three is a guale for every requirement. Write to The American Rolling Mill Company, 2251 Cartis Street, Middletown, Ohio.

THE AMERICAN ROLLING MILL COMPANY
or k of and comes back for more.

STIATION, September, 2942

ATTATION, Reptseder, 305





The 165T ynets are still more 0 deg. F chill of dry per (COL) for um within 10 can, ofter removal m the sky see box. Therefore \$65 on the production have Fig. 53 shears the properties of ow" that of 7757 wheat was 1250 and Al750 wire. All rivel. ages were subperied to a standard without commenced in 50 day F water

from 0.054 and 0.105 in 1053

into it was found that the description

1 hr. Rivets deives after they

ALUST roots due to actes. The two lower curves of Fig. 53 concern Allist nests. The betton earns given the driving, in which the rivets were nerparet to 27,000 year It to therefore cofour days to elapse between best treat. rural and matalishes, to our the birker The moves two entrees of Fig. 23. ready to 1707 parts. The curve accord 37,000 per, shour adments obtained by driver the rivels within the owner-

corne discourse the \$1,000 45,000 mile

show elements obtamable by donang

the 1757 wests often them dend ander

To be over, the higher shear proper-

only seeignibly affected Cracked root

the north-organic denotary at the wore problem extens primer and posset

seriorie one of the hardwarm consis-

to develop full strength. The toroit strengths of all of the mosts were worker of sudscaling that superficul crecks in are not cause for concern or replace elevated-temperature arms on A1783 L. Agine of drives 1787 rivets at

2. Agent of Orner Al787 rivers up

Brief operation -abusted to the

The Alamoure Co. of Asserting on

"Crocking at the edge of the head

from driving rivets that have under

## It's Okay, Mora

We have this on one on a last whose in America wars our fighting men to To help bring them safely horne, we've produce. The finest of food, electrons

Rel Asserbes are designed with most prescribes seusocias the pilot . . .

With self perfect one rooks bulk into American plants old weight, With builty resistant "armor elect".... make drives problems toucher. But Wat - 37 mm cannon in the noor (After all, an explosive cannon shell burthing at the energy to a pecty good. American buy who might not have come home without them.





IATION, September, 1841





## Ceiling ZERO? Not any more!

"Grossdwork" for precision machining of elecroft parts laid by OSTUCO

by, form their "surbrellar" over enemy positions, they



tables on the same upon for fifty years, are constantly existing none experience from their offices to better till

taking to required military specifications, with the recreserve markining amounties, OSTUCO's experienced company's envishic record of low pricetions and "on time" deliveries - from ever-shapeling year detrooch. Manufactures of Victory weapons are now getting the branks of this new experience. It is also being

expension, encogisco, starten and other accessories.

To meed this work, OSTUCO sandles worsless and

VICTORY REMINDERS But more War found a Write in the

name his No. I postwar worry and the ere he will arrowally reals that for the payrolls and seed money name presenting production." He known that his industry ment be ed to necomplate adoptate reconpart to encount or also encomment mary west do the lob. Otherwise this or grant of most production that sums up from the sphere of the rafts may he considered as co. The economies than made it year easy

similar peopress is no prevision to get them out. no for Congress to matthe occurren minumics reserves. How will the unione tenhers are able to meet the m from war to peace poobably I be decided in the gest Ino or these need in contactly as there No wender the industry feets that iony. Here, of ever, is a case for same wheather since streetly realon a raisely different from that of to make of expression made held

Tely the antemphile industry for onstate (and what is said of this radeoby a absent equally true of the tire irra obsessetta valle regionera ours, cavenualts, take possesses, 1001.002 new passenger cars in the of fre years after the war endsmonthly 6,000,000 errs in each of the industry, which will newborn such pances planes in 1963, can look rward to a normal peacetime cutput 4 5,000 private couft and 500 transport char, according to estimates of the But the point is that sireraft, tank,

is making feight reasonable although of coccure profits while the destand up on their "brend and heller" in. They seem to have no payrenon for this arefly is not dul The voteres sedantry enand I was the and of 1941 to Mer. 1945. mer. Motors Corp., to cite the languat topory, has retaldahed postwar com-

Stor ood for total postwar reserve Next 1 1,000,000, and it is sift owing ATTAYLON, September, 1845.

### RECONVERSION RESERVES They're Postwar Worry No. 1

tion officials have streamly retreated that pooffer on Assert conference may be

Nor have alrested wealth home too

freely distributed to stockholders. Con-

care the author. If airrest and other

advice for companies seeking postwar nancial stability:

Keep your frances as liquid as pea-

be emight with encourse ignosperies

in a critical period when very material

recognizace period-which may come

Persona a capital expenditure but ert and an operation hadout for the

in englandarly your reserves. Plea year operations in you won't

lower this year. .

BY EAVMOND I. HOADLEY

no. Chrysler Curp, is setting acids plants and impre the maximum that is considered a postwar next. Manage-\$3,000,000 such month for postwar reconversion busides other smaller last ment has failed then far to make any serves of \$36,151,000 at the 1942 yearrad odan \$28,000,000 in postuar swellts. such receives so those of the seasoned industries which are filling in on was work, abbused the eviation industry's Spopee in New Deal circles, suggested recently that a sevenance pay of six It is the creat profestore of the months he made to war workers. That plane makes that if was their very low terrings in the prewar years which were med as a lay base. Then it is that won-Value, recently pointed out to a Conexeminal committee his eccurrence's of many other industries. One could al-1942 eargenes were equal to about two works' pay. It would take twolve your In make on the rest of the six months Destruct receives are necessary and

many relevates it rests around 24. con,000, to build the protetype of a scholated Voltes for instance with large planenger plane and that the tool \$5,000,000 to correctly last year month cet \$1,000,000 in dividends. Denseles Afternative and and the former on small or ductrial executives now before then Labor can, so it is duing, bay made they feel they will need more money bresh But generatest not only eighous terials, pay labor, carry mesodance, and do, bot even takes ever the reserves meet other expresses. These executives that should be established to preceived now play to lay asifetimes larger each recerves than beretoduce to meet future working capital needs. It World Be a Smart Mayo

the paypalls but also to design and pro-

recently used the allowance of canesonvenion reserves. But the service departness: soldly oppose may sold Under Secretary of the Navy For-rectal, for example, feels that the casetion of allowing a portion of wrests for handed in renerstiation slove. Therewas such telk but suring that Congress

to date was to tughter, the law by quietly bringing defrace plent contracts (Term in near 205)

THE OHIO SEAMLESS TUBE COMPANY





Representative Parting Rooms Described

BUNU

· Aircraft bearings today demand more of specialized nowledge, skill and manufacknowledge, skill and manufacturing equipment than ever be Conservation in Canada's fore were employed in the po-More exacting standards continually are established. Speci

Inspection is ever more search ing. New and unprecedented peny constant advancement is We will appreciate an organ

tunity to quote on your specifications or to discuss your bearing requirements for any second-se of labor, one, and mate application in the light of truly comprehensive experience The Bunting Brass & Broom Company Toledo Ohio Ware

renferturers. To those cabilety were houses in Principal Cities. vide not only the factory executives -color what the other factors is white-a commerce. The rabilit ble

to Denorthest of Masshon, & Sepiff he held energy reliable to Toronto sector of weekt in the faal somethy of second the same bear bear assessed The existance nece on arranged that each could not about second province to true, material, marking tools, and dolnew material. The whole story is there Assent the firm taking part in the Aurilana were Bosine Camelian Cor & Wroterdone, deHardlend, Faircidd

taken arbible over more acces to the

more than \$00,000 lb. of materials, 2,600,000 marriages, and \$4,544,723. Seems plans communicate consequent for annealment characters. America, Flori Alerraft, Nanciera Accepted, and Ottown Car & Accept. found in the small ries of identifica-Size labels. Forcerly these upp on craft, marrier reliable and accuse

present in Toronto disable faces here) resument conservation of

per unto Consider averrally decolorum nis transfers are affixed where energy of labels were forested used. On the Constantly tracking down "the better way," Demision eviation compoint have effected prime services in meterials, mendeurs, and Pefrebild Aspereft, Die, estimates that priving material and 20,000 to of labor

> completed-up labor and time saving explicit by a narroy said review, or queries coreful hand work in the affix-Do of brane about cock aver on the

after enting with other broken, seven 600 B. of sheet steel 600 ball hearings. and 10,000 hr of labor. The war to I (Zerre in page 285)

ATIATION, September, 300 ATIATION, September, 1941

sh, the Canadian povernment's war-

for parametricity of Complete parameters, calcium to To-

rate and Messeral constant old and new methods, precising to

out respects, and weight the various measure taken to our restricts, near, laker, and menny. Processes and orchitiques

Aircraft Industry

BY JAMES MONTAGNES "Ariefon's" Carefor Communical



More powerful, smoother rupning signing sozines are already in testing chambers where data provided by modern equipment will quickly ground them or attaction their wines. Others are on drawing boards ready for production. However revolutionary tomorrow's engines may be, lacobson will be prepared to provide test stands and equipment for their testing and maisteenance.

Incobson engineers, working closely with engine New Air Forces, are anticipative tomorrow's needs in the development and construction of today's engine test equipment. This advence planning is as important part of Iscobson's service in the design. angineering, manufacture, and installation of angins

## EXECUTIVE OFFICES: 335 BAST 45th STREET, NEW YORK, N. Y. In Canada: JACORSON & COMPANY CANADIAN LTD., MONTERAL P. Q.

ATLATION, September, 1947 AVEL TION, September, 1943

### Wanted: A Haven for Aviation Securities

ments in artistion conflict are at their

lovest noist once they existed popular

A number of the country's lorsest

and better monored funds do not near

near For evenole State Street In-

pletely lighting in evinted severies.

Incodery (both under the same man-

By H. L. PEDERMAN state of largermant treet heldless shows both treasport and many charles atocks dropped from trust partielles, microries public spathy.

come constition are no booser to wide popular demand. At least of the portfolion of the selion's leadto send of tests or defects for march seather. More reported, though the rune as a whole controls hour proofour of expetal which can be of ma-It is estempling to observe the incirmarkey lack of existen nevertiles sums incontract tract funds. Table lefor exceives the naterial beaon covers assistantions should be ested. For one three three to no common that change have not been made mily show a different picture General doest find managers, are not inditie or yedging mindet breads and and true viewpoont toward axiates. Beld, course on he selds observed Austra receptor programme nontesterly popular with presentment

tree is clearly the favority Moreover. led to the more organization undustries sensord role. For example, with more by reconstruents. Norther the air trens. remorts available at the true, Avantors for Man. 1963 showed that sever 46 touch eventuel, 12 owned a total of nincrial developments. Nevertheless, Dec. 31, 1941. As of June 33, 1943. 12 cet of the 20 trusts exempted held h - probable that the height of imsetts Investors increased its hobburs lla si apparentent bast toucher from 15,000 to 45,000 shares. budgers and, restrange magazing to much wing the second half of 1641. Scare had for post war semal trade routes-Time there has been a consistent

being antisepated. It is a fair securior, an mempaly over certain poster, mvactors will take another look or the Assert the describe energy, United Course the real or resemble tecopolic inthere strategie modifice sources to be in the furritual of air Irons nor

have measurable artablehed a mound of stability in corriers. vertured, with total access of about Absent from all treat fund lists exended were the charge of TWA the to understodly due to the fact that its group. Ironically, the Chemical Fund, morniment tract portfolso, faterest instrument true percons. Inservehearted by Married Barbon, which were about 45 persont of TWA's autitualizanation in sights consten. Many other for about a year. The may carry and number of uneffications. It is resultible ests in air transports. Even the tetter men about the period of board or describbe. More block however the compete with the public in hidden upthe price of TWA in the warket will be resulted that in purpole of



market weakness, the Hagher misperia

(Farm to many 205)

BARRON'S STOCK AVERAGES

the did the west record date and olde-June 30, 2945 - trust fund savestof the international are nearest that in



## How Precise is Precision?

A TAMES BIOMS

Marke your surdetick is a fine watch. Ones is a Remove Under a metallurgical microscope our technicians on 12-rylinder in-line, air-cooled engine. See the comparithe ornius of craftsmanship, are responsible for the

Rasper's outstanding precision performance. There's the spectroscope, for example—so sensitive it can upot a particle of metal ar mittate as tearn mets in a mes it to explore and to control PARTS - shows \$500

the metals in Renew regimes.

A quarter million volt X-Ray

secrets that are higher beneath

our engineers which metals can

read the bistopy of any metal . . . tell how it was sencoved during manufacture. With electrical instruments they can detect a flar one ten-thousandth of an inch in death that could be come a hottordess oit of durace A beam of black light is played over muchined sus-

PRECISION INCOME.

STIFD of maring perty - (astess per ----

PREZERON mennere move impeller shall recornisher extractor are receive matters for Ranger engagests and scientists, Result the Ranger Foring - combinatored precision and power . . . another Forchild "touch of tomorre-

faces to expose the structural "criminals" that may lark These and hundreds of other

ANTAULON, Serventer, 1881

THERE IS A PLACE FOR A SHINY NOSE

> Beechgraft Training Planes, Through the clear transparency of their plantic walls, the student bombandless and \* \* More transparent than class. Acco-Quality Lumarith transmits held up to 90%, set is atahilliand to intercept the oltra-violet rave and improve weathering qualities. \* \* Lumarith has bish impact strength - resists concurtion of close-by explosion, the stress of violent air-recourse changes, and the shock of engagery landings as a Lampaith Plantice sid kits, ventilator takes, instrument dials, radio parts, represents, ammerities relieve, fiel reserve. etc. + + Celanese Cellulard Cornecation. The First Nome in Pleases 100 Madison Ave. New York Sole Producer of Lungrish" and Cellulaid slactics .... Representation: Cleveland, Davies, Philadelphia. Chicago, St. Louis, Detroit, Los Angeles, Washington,

Calamity for the Axis is incubated in the "noor" of these

Aero Quality

"Toute Marks Rep. U. S. Pon. OR.

IATION, September, 1942

## Division of Feirchild Engine and Airplane Corporation . Ferminedate, Lage Island



VICKERS HYDROMOTIVE CONTROLS

VICKERS Hydraulic Equipment is used The Curties "Communic" Correct port illustrated here is representative.

Vickers Hydraulic Controls are high someone oil hydraulic centrals that are so widely used because they do the lob dependably, smoothly and accurately ... no matter bow severs the service. They are inconsitive to shock and vibration yet light in wright . . . easy to adjust ... admirably suited to sircraft needs.

PARTY OF PERSONS TOURS NAMED IN



war portion of worthout embilions of Convolidant Vol. in PSA Condina attachment to fundam A (above) conrepresents. Laboral streams are taken up by tree-type members F. G. and M.

ing streeture of Consolidated Volter TBY Coming (fight) with front spar at A and year spar at P, shows done types of hullshouth employed. Breiting web type C. which provides support for wing stret leader from type D and in remainder of want and solid facilities such tone at test in companies of wang, and sold but light web type at E. Beliberal E. in enthered and of inorgral fact tank of which came form fore and all walls. (Also are Accurrence



H BOOK

DESIGN DETAIL

emette etegram et gear train et strended engine which delivers 220 in. of 2,000 cem.

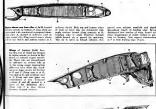
OFFICIAL PROPOGRAPH, C. S. ARREY AND PORCES.

ENGINEERS AND

ATIATION, September, 7

TATION, Suppositor, 1945







CASTING

The remarkable properties of mag-nesium, including its easy machinabil

ity, which are proving their worth in war, will be equally valuable in many peace-time predicts, a trend in which Howard Foundry Company's output At the other two Herend foundates. dominum and becare castings are being powered into fighting equipment of many kinds. Combined, these three oundries provide the largest non-errors jobbing eastings production in When you need nonferrous castings, call on Howard. For armement todayfor acilier tomorrow, HOWARD FOUNDRY CO. 4900 Steemingtels Board, Charges

ATTATION, Reprendent 19 411 17100. September, 1911

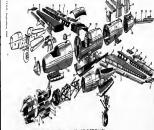


tribute to the tireless efforts of every man and woman engaged in pircraft. For it is THEY who produce the power un expented to police the future nears. ROREC PURP COMPANY . ELYNIA, ONIO, U. S. A.

Annalestation of Alexand People and Accounting

FIRST IN DEPENDABILITY

AVIATION, September 15



#### Explained view shawing major components of famed Mortin B-25 Merceider IL Ger vig ser 16. Edwar saik bening networkin I Ter fo.

38. Gene van

16 Erzer owing

14 Fates delisar IL Educated brong law setter

to New heat her show If Four sixt 1 Ocer viso 2 Applier hold for does 14 Revel tel solos 10 From word of order 4 Traffer rite 20 Laws made M forder one of deep & Alicen bir tal 22. Mais bedus over & blood viry let

% Node brottl er Cares bie bie IL Fencal opin risg N Rough (seed feeling settle) 4 Belle bie 10

## Review of Patents

Distances are digital of some of the more completed in the many completed protections of the more completed protection of the complete of the

region, D. C.

Trypter Bailer Derling, Uwd. as high transcription for service in the product growing properties of the product of the service in the many designation of the service in th

Now Experiment Theories as a second of the Common angled to depend on the Common angled to de

Secretary in the secret

of blad distance. It remains that the blad disks terrorise the pure binaries and a verificity terrorise remainsent to provide the provided distance of a verificity terrorise remainsent to provide the provided distance of the provided distance of

Supe A. They are regard and learned by

vertex parks of garded to a minorizance flows

survey parks of garded to a minorizance flows

specially and the survey of the surv

ordered from on the execution, convex of the control of the contro

Control System for Alexands. At in proceed hand received handers arrange man.

As the contribution of the both the port of the contribution of th

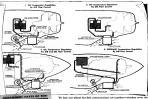
the one will have assumed harmorily time that present the control of the Collection Coll

whether the the control of the contr

Young Presents
ADVANCEMENTS

in Aircraft Engine Oil and Coolant Temperature Regulation Systems

1 00 Insurance Regulation





until topping or in the frigid namesphere—POONE often from free new assume. On the Colon Temperous Registering systems, degramation, and the Colon Temperous Registering systems, degramation, and the colon temperous response on the colon temperous response to the colon temperous response decision and to the colon temperous response decision. At a first deeper of colon temperous registeriors, (a) A faire deeper of colon temperous registeriors, (a) A faire deeper of colon temperous registeriors, (a) A faire deeper of colon temperous registeriors, (b) A faire deeper of colon temperous registeriors, (c) and (c) and (c) are colon temperous registeriors, (d) a faire deeper of colon temperous registeriors, (d) and (

TOUNG

Canton Annual Water Continue or their Plants



we don't recommend for MaGes's toe-hold party in what he soon! These nine G. E electrodes make it possible to use afternating-current for more than 75 per cent of all are politing. That mesos easier welding, more preferry decompos, and up to 1/3 feater welding then is practical in confection welding with descr.

a c, and each is backed by an impressive service record, The W-26 is perticularly outstanding. Developed especally for feet-class are welding in the vertical and overhend mostlions, this electrode countles with all the following specifications A.W.S. Filler Metal Specificstion E-6011; Navy Burers of Steps, Specification

66E3, Grade 111, Cines I. American Bureau of Skinper Specification HtG and BtG: A.S.M.E. Bole

Thousands of users have found that these electrods and G-E alternation-current welders are the perfet combination for the fast saiding speeds and high anality make product to meet mustime productive schedules. If you are not already using a-c welding ! will now you to investigate its many advantages. Significontact were C.W assumbling distributor or print

# with all these good A-C ELECTRODES every welding job is easy!"

75 PER CENT of all Arc Welding Work Can Be Done Most Effectively with G-E A-C WELDERS and These NINE Heavily Conted G-E ELECTRODES

APPLICATION	e-t munete	CLASS IA W.S.
Mild steel in any position	W-16	E-M000
	W-20 W-20	0-6012
	W-25	1-60/3
Mild steel in the flat position, and horizontal Silets	W-24	E-6020
	W-23	E-6430
High-toodle cleel in the flat position, and herisocial fillets	W-54	6-7120
Cost-lines repeir	W-63	
Water-resisting surfaces	W-81	









The shape of things to come-like the "Aircar" pictured above-in anyone's guess, but this much n certain.

Out of such improved structural and design develcoments as the FRT-2 sirviene Pletcher Aviation is building today will come a new simplified fabeteation technique for the air equipment of temorrow. The Fletcher fabrication process already has demcontrated its cardinal advantages in such wideextend applications for the U.S. Government as it. sirplenes, sirborne refuelling units, gliders, airdevelopments.

PARADENA - CALIFORNIA



SUB CLASSIFICATION

## **Army Air Force Standards** NUMBERING CODE adopted as interchangeable standards by the Army and Navy. Persons

renairies further data are referred to U. S. Army Air Carps Stundards.

This is a list of these parts which the AAF has selected as standard for aircraft ensylvaction. All persons proporing designs are required to one these standard articles. Frefix AM indicates parts have been

ANI6	Hold, here, had, delibed for pin.	(10 (2/16) to	AN no is the it 10th. Dust to give bright in index and right a mean hold and defined. DD somes also some also bed; not bed; name also some also bed; not defined by give.		
AN20 to AN36	Bell, davis.	100 to 1 to.	AN no is the plan 20. Dush no given length in 16ths. Use A length if and delbot. Knamphy AN20-16, is 0-16 the obvious 1 as less.		
VAS P	Buit, syn, drided shark.	600 to 1/2 eye.	Enough for ANGI (2002, AN number in ope die, in 18the plant Dayle on, given alastic brough in melten sold eighthe. Eines ANGI-7 is crededly seigh 6/12 heir in very and 7/7 in lang aband.		
ANIA	Note her delied	/33 to 3/4	AN number or date in 20th's place TO. Longth in inches and only us given by duck to. If NO thread at used A replaces than ample: ANNALS in delical head NO thread bell 2.4 da. and 1 loop. Experience ANNALS in bell 2.44 da.		
AN100	Thinds, wire		Dank no ploss cable dia in Nest, Example: AVIOU-6 is this for \$1/12 dia, cable.		
AXID	France raids	Same on ANION	Asser as ANSE		
ANIIS	Shockin, eable	not to 17,000 in breaking strongth	Duck to. is strength in 190-th, units. Example: ANIII-6 sharkle for \$1000 th cable.		
AVIN	Turnbuckle, cable ope and busy				
AND6	Turnbuckle, epide ape and	Short, 4.5 m., lone, 5 to 9.5	Each ac gives strength as in ANIIS. Use 2 or T allow dash to indicate phort or long. Example. ANIES-180 at about to		
ANDE	Turnbuckle, salds syst. Turnbuckle, both		buckle with cable eye and you eye, breeding strongth 1,000 B.		
ANDRE	Bearing, beary daty.	pic to \$76 bels	Unit on in hole due in 1986. It is place of dust recognised for pro- RE or self-eligibles. IEE is refer bearing. Examples. ANSA is not suppose broating with 114 hole. These or ANSA with a other hole on.		
ANCHE	Differ, materi	Dank as	Thomas are AN 2000 with A solver rhash me.		
ANZO	rubbs, routes,	Policy da.	135 25 2 15 6 6 10 14		
AN206	Fastener, post		shook, 2 bing shook, all 2 (6 dis, um 5 after dock to ; if three facts		
AN200	Orements, place and oper	00 to 2.	Dush no. or concurrently one, using 20 for 00 and 13 for 0, 2 trans, A for plans simulations, 85 for beans open. Reasonable AN BOS as beans open groupout, also 1. Forms follow to rain.		
f255	Heat, helby.	0/32 to 7/36	Duck on a middle of book in 22ml. Example: 256-12 in in heats 12/32 wide.		
AN240	Eprint, hoing.	1/4 to 4/14	Duck to: give that of hole in 16th. Example: ANDED 9 is ey		
1220	Hings, buil,	1/2 x 1/2 to 0 x 3.	No rain. Give nice required		
ANIM	Hings, exating-	0.4 to 2 wide, lengths to 72 in.	No rain.		
1277	Jenn, sorrenal	1/2 to 1 1/2 dis	Death no. in disagraphish. A for my sharing Hiller system, Histor.		



· Notices to the wilder flights of function does the winted horse of runbolacy compare to the everyday miracles performed by the great fiving bosts of Pan American Airways.

But Pegasus had one advantage! He didn't have to free over the problems of supplies, name repairs and the morial details of majorenance that make Pan American's world-wide operations all

the more remarkable in their amuzing efformer Valspar is quice proud of the fact that this fundame sirvers server uses cen-

delivers complete surisfaction in every What Valspar Val-Aero Pinishes do tain Valuear Val-Aero fraishes at its for P A A-they can do for you.



A complete that of debandable Absorb Plaicher that meet Government specifi cerient, a Videntine & Company, Inc., 13 East With St. New York, N. Y. o. For. 1812 Makers of the Famous Volumer Finishes

AVIATION, September, 1rd

hoses in New York, Minmi and Rio de

In its uninterrupted use of these fine

finishes P A A impections show Val-

Arm stands un under sevenur service....



Palest. Nat. this filer

Not. Dur box Not, ther both product made Not, this moral is all to m. Nat, metal look. As both both of all. As Military of the ANDRO

ANGS Tin, leek

ATTATION, September, 1962

ANGS then alog

13, 204, 5/15 Chees, and and. | Yes 8/9 x 506

Thed with

1/15 to 5/5.

First death to, given the in \$600. Strongs death on, given length in \$2501. First single in replaced by A for shopy o're' and B of the \$6.0 kd, C for threader held, D is or shollow o're' to id. Strongs death in replaced by A for support, B for branc, C for alloy. Exemples. ACCRETERING to first house strong, 150 days, C for alloy. Exemples. ACCRETERING to first house strong, 150 days, C for alloy. -L -2 take 1/4 pin, -L -4 take 5/35 pin, Claric, and and, For 1/8-26 NF Stone and dash one, so ANGEL

To be coeffeed and most

Dush no us dis, of bolt in 16th. ANNS and ANIM use it and L after dash to, to infinite right or left threats. ANSS is found finely only. Emprojee: UNISS 7 to 7/10 plant region use, UNISS 61, is 3/6 plan ont, left hand threat. /03 to 1 in. Dash in, as seem to, R is used central of dock for beam and D for other main. Example: ANDERS at beam 16 marking agree and, fine cheese, Not, market Dark on, is notice to, and tak in over size, and dis, is Mith for both sizes II for force. Example ANNOUNDS is bean wingout for ANN owner.

SUB CLASSIFICATION

Dush to, even dis, in 20th, billowed by tot, as part of same year. her. Economic 200 624 is calcast for A it helt. 24 tol. Dusk no. is serve to. Yellowed by tpl. D is used for alley and F for their instead of dash. Example: 200101012 is their lock alley

D-12 (conf'd) Perior-Materials

AAF Materials

1/18 to 1/4 din., First dash no gives do. in 20th d. Second gives fought in sparsion, 1/2 to 4 hour. B at for form, C for recovery resorted, at place of feet dark. Floor dark to. or pic on Second desh or is jungth of toper in rightion. Knample 265-60-4 is toper pin / 000000, 6 % long Sums or \$500, except that A is used if not drilled for cotton First deals so, in file, in 18th plus 280. Record is longth in 20th from under beed to insele edge of pinhole. Example: ANSS-19

ANGESA is for single stat, ANGES is made in over lashes up to T. Duck no. or length to unches. First death no. is dis. in 20th I forced death no. is longth in 18th. C replaces first death for respect, D for 1787, DD for 2487, AD for ATMY Emmajors ANSEDS-1 is 1787 e/vet, 17th dis., 1,15 imp. ANSEDS-6-is n copper o'v's his Torst, 5/22 dis., 5/18 less.



#### 7,000,000 miles . . . 50,000 passengers!

· SINCE MAY, 1939. Par American Cliquets have flows the Atlantic more than 1900 Heart . . . parried more than 50,000 namework . . . learned more than 7,000,000 And this is only one division of Pan American's World Airways System! RET . . . before those record-breaking finites could be reads the famous Divine Climer Shine

had to conscious most fermidable obstacles within themselves, frincing and most For this perable mechanical mirrors, we can thank one sited mechanism-most.

friction bearings! They reduce friction . . . keep metal . . . . . . postpone wear . . . and maintain process location of parts. NEW DEPARTURE hall bearings, by the tens of mellions, are used in planes, shine, tanks, trucks, joyn- and in the muchines which make them. In fact New Departure has a major responsibility in the whole hall bearing was production arrowses.



while a success nexts forced to year in Point to be stoutly menutores that a believeter would here had him, too. hone "in time for show." He got come depoint put and province receipt serial expulse, he came through it all is much

. Der beneuth the freth of glessoer knew to this day by hew many lashes subjects which captiful the WAFS and you find serious, hard workens suits ole my really doing a job. Dyr. New ben ther're side delightfully francese. they in the anothering heart of Terms as other day, for of them had out associated a yough day's flight to deliver ome pressure trainers. They were defilater as they strausfed late the tersign) leaded down with nationary and willy parachete marks. In a remarkable short time, bewerer, their resp-Community Persoing Delicion Even usy about time before they hearded the

ten whe's a walkage of for the help mater Firing over some yangles to left out. The what intended to be last og, but he feasily was shie to mght the place and fly home. Meanwhile, the ome natives, who had here back at his of the 200 ft. high! about five miles man Making a man of his passables should been by Smally and to the impele men located by his squadree motor. For for date they descried uncoherand sends notes demanding correct-

Then, as before, they quetly numbed their own houses.

. To the old timers, equipment which toler's war whele \$5 to nothing short of wonderful. But with all the gudgets sed power-particularly the letter-of first daywood, some of the OT's std. paren with more then 15 ft to space

word, the vocapeters really miss a lot of rarelement. There was the chap, for littlener, who efter house through the Securit with body Roston-wallran strands on on the stick. But one day pery on rates bille sails and the weens there is do, for he polled the state

he waste absent the case. He was too hour critics the sick back to place.

without benefit of hanger or other weather restaction. One day a sink member west out, shortly after a loandalo't take off. He steggered offcharger the appropriate requests brook by freer-than-percual mehrs. Then he tale, but without raceros, the second he started to make her tarm, Finally, approaching the inevitable companies talk he decided he'd better get back to the field, and so he started mie a very shallow bank for a wode ter view obliger right the wine west



moved to the left. The weight was put too much for my Jrang's controls. . It's very sare to know that a clider. right on down, but sharp, splettering the rolet clumbed out, but he beens to Doc, is it perfered to ask "how much doubt his arms when he saw water of any, load shi the tee plane entry?"



below. but he'll try couthing to get more than he nature advenance.

HEW DEPARTURE . DIVISION OF DENERAL MOTORS . BRISTOL, CONNECTICUS AVIATION, September, 1941 AVIATION, September, 1943



Cuno Filters help safeguard 85% of flights to and from Philadelphia



You get a good idea of how well the aircraft manufacturing and sir transportation industries rely on the Cure method of fluid protection when you learn that \$5% of the eleven "coming and spine" at the Philadelphia Municipal Airport are Caro-equipped.

"Cuso-essioped" means that the engine lube system or hydraulic control system or both are guarded against damage due to first borne solids bethe Corne type of oder filtration - affordance contact tion that is usualive, continuously-cleanable, trouble free, permanent. Cure was first in the development of filters for removing sludge from strereft comos lubrication trytems. Cupo is first, today, in the choice of manufacturers and sirlings - remove by relitions of rolless

CUNG DESIGN PEATURES Light, compact, yet bundles full flow - ideal for accords assets All-cortal filter discs are permanent, non-collegable -- nearing

"Confine" (remmy is positive - process imbeddy) as well as adherent accumulations. Continuously chanable while in operation - other manually or materialisably by research of a timp built in hardender manually Recen capacity interes unwaying flow at low operating CUNO SERVICE FEATURES.

Cooperating shouly with servessional engineers, Cano mighners have breadened the mope of Come applications to sover Parthernors, Core's advisory-management staff follows through on all installations - making more than operating cover maintenance. Reperience has proved that made performance can be existenced easily and with a minusum expense of time. AVIATION, September, 1985 SOME TYPICAL INSTALLATIONS ENGINE LUBE OIL: Come Auto Elean strains full flow of engine hybrication of.
Filter built as an on strayed part of engine — self-element
in flight — no enternal commences. SUPERCHARGER LUBE OIL:

Superchaper bearings are protected agency oil-boxes particles by a Case Assen-Kleen which filters all taken from some superchaper. HYDRAULIC CONTROL SYSTEM Come Acto-Rices, installed in high personer line beyond the regime drawn pump, personnie demage or cloquing of tracking mains in hydroxic country sources.

of the street tack - passe through school Speci - from strenge tank - passes through exhaust meter and cabin host cachanges to provide her under and paley heat for embring. Conn Anto-Elsen filters gipen is 2007. - protects working parts, presents assumption

AVIATION, September, 1945

Send for FREE booklet, "Quick Facts" CUNO ENGINEERING CORPORATION 709 South Vine Street, Meriden, Conn.

"FILTER-FINE" STRAINER



CRUISE CONTROL For Flying Efficiency

> Part III . . . Pawer Control R. DIXON SPEAS, And In Frenches, Engineering JEER Y. BARAN Chief State Audies

SANFORD NINTON, /Sper Amount Annies Artis

Revealed are the latest methods of cutting segine fuel costs through the was of maters, charts, and calculators.

vertee, or the estiman reserved developed is proportional to both P x A and N. Fire a group session A and L. the tower minot of the regrees under are constant, as the power formula bethe prevailing emplitions. In order to make mountly this names control women method much be adopted for accurately setting power is Sight, since it is upon he means of a mitable ocurersion factor, measurement of torque becomes The topuscenter is designed to mean the perpose, the more important besee the torque delivered to the propriand (2) the subsect or predicates from

ber shaft, as shown in Port 1. Virtually which depends upon setting up conditions willing the engine which are with planetary reduction gentley be brown to produce certain pomerwere revine and prunaller. The smok-Mechanical types of power-determinshall drives the ceter ring, the prenedles shaft a attacked to the obseste terratractors, and the recently dough geer (which is stationary when no In the equation Hp. or PLAN/32,000. where P - Man, donner syric; L picton stroke in feet; A = parton area; the means of an arm) to a person in a and N m Epm, the force P × A becomes forces when converted from Darest carrie operation the conrecinementary to rotary motion by the metaboli. The the terms designed person in adjusted to 2 receives despite

same. This become exactly a recovery on

the oil in the extanter directly preser-

found to the propeller torque, and

twee Arrestly as 2 y A Fee

bermpower in a time-cate countity

I work done per tell feme) on power

remover is transmitted to a cure in the rockpit, where it is used as a measurecuring inchemeter and a convention contact. Days, Termenter by. -The transmission is a second and or

doubt range the adoption in routine six-A thrustmeter measures the thrust from naturally being numbered by the correlate sensity through a proved the of summe suspension or in the come continue itself. This tentmented prospers a constity which a correlate to engine never by prepairing efficiency. to its use to postine from in headed or the fact that conditions undersold affecting propolicy efficiency, such as its to be greatly exceeded if a specified threat were maintained. The thrustmeter has been used in Sight test work with some measure of excess The horsenower meter combines starvirally the topour output with the angune speed to produce a direct undiraise of developed honesower. This

appears to be the most authfastory so officered to medica tones monthly wase it rives direct beneficiers read ingy B should be remembered that the spec for each power should be that for man hone or Thee, some indentice of thus, would be necessary as a goodengine power, fony maje, variables much newson. (2) recurre allitude, and (4) bencembers of air entering carbonics. An engine produces more power on the existence is receive Vestative

weight of air cetering the sylkaders, ATTATION, September, 194

manifold pressure. If rpm, manifold martest, a change in altitude produces personaler share is never process against the exhaust, due to Temperature of the enterior air of for the sense because it is a property alle from humine the charge in the otuder. The lawer the temperature with the penult that more fuel can be Enrice mover sharts are usually to teo parts: (1) Sea Sevel calciumies, and (2) altitude emblyation. The sec and chart is shown in Fig. 2. Its use

a self orplanatory. For example, at one and and standard temperature on an gior is reasing at 1,500 raus, with a is manifold pressure up to the interoble very class tower sellines and section of the 1,500 year, line, then felcoupled. Usually, the becommenter is he acres to the right and the power regarded only as an instrument for orrealing is \$45 bp. The sea level call bestoo piote the by, available at sea nairements in power control will be Fig 3. This is obtained by renegar the mores at full threetile at various abli-

> elitude. For example, tests would be mode at are level, 5,000 ft., 18,000 ft. 35,300 ft. and 25,000 ft, and al mach thereis at a full rence of case, from 1490 rose, to 5,399 year at matervals of 300 rpm. Results wealt then he Full thentile power at any skittede.

rym under consideration, they left to the lip, scale The full throttle ho. everlable at that altitude and open to may diagonally across the events are three is manifold tomorre at rush russ. and abitude condrag and then drawing We have thus, in the two exemples found the hp. available at one breat

yes throttle, with 1,800 spec and 30 W. thendidd wrongers and with the same The ned manifold pressure at full retir at 16,500 ft. When the two three the monal agreementation of onthe power charts. The operators now because the power increases with the

in 4. Standard pilot's power table Front C-102 regues, ATLATION, September, 1945.



Fig. 1. Disgram of married parts of incomments

criers on in hear power in determined at level and the full through names at all i tade If the power at on beed and the mover at altitude for any combine. power at new altitude for that combine. tion of spen and manifold prossure in known. In the example, the power soulable at 1000 ft. for 1500 resand 30 or countfold pressure, is 570 ho.

rare, shows the pressure at all altitudes streetion of the curve the mover at 10,560 ft., 1,800 rpm, and 50 in, max feld presents in fell through name that combination is not receible at any allitude newer are not exactly nameful The fine connecting the power at sea but they are negaly enough so that they





## WITH BLUEPRINTS and WITHOUT

The bird of nature is a creation without blueprints. The bird of man springs from his mind and hand as he works at the drawing board with pencils. The best drawing pencil is none too good for this work. We believe we furnish that indispensable part in Dixon's \*Tunbenite ELDORADO drawing pencils.



TThe new booklet describing the Typhonite proper is offered to exceedable destroyee. Write for your copy recetioning this publication. **TYPHONITE** 

**ELDORADO** PENCIL SALES DEPARTMENT 61-79 - JOSEPH DIXON CRUCIALE CO. - JERSEY CITY, N. J. AVIATION, September, 1943

Plan. 2 and 3. Graphs for ragine performance at sea level (lieb) and at altitude (right).

better thus standard, with a power reinclos of 2 percent, resulting he





Fig. 6. The Wright cruising power saleula-ner Press of device in as left, bank at right. For enries basing more than one reporturer par rate, a separate ad





hits of thousands of sireroft workers on the production lines of leading sireraft, ensine and instrument manufacts in the kits of original equipment espatied with every easing hipped by leading sircraft engine manufacturers. been selected because their quality has been proved three

the years quality that has gained them the results "the forest that money can buy," It's an unbeatable combination—entatanding design, ma

production, skilled pilots and errors, expert ground service and BONNEY TOOLS.





MAKES PAINT STICK TO ALL AIRCRAFT METALS (Except Magnesium). Removes and Prevents Corrosion, For preparing gluminum and other alloy mosts before polation. For removing lead stains caused by ethyl gaseline combustion,

TURCO W. O. #1, the mold, low-cost photohyticing method used extensively by many aircraft manufacturers, is vernatile-outck and dependable in action and easy in application. This process is equally successful either for completely assembled units or for touch-up week. TURCO W. O. #1 provides the required passivation for aluminum and also minum allow surfaces as well as all other structural metals except magnesium.

and other finishes. It inhibits rust thus perventing oxidation of any exposed sees. TURCO W. O. #1 is easily profited by hand or by tunk immersion. The customary dilution is 1 part TURCO W. O. at 1 to 4 parts water. The hand method requires only the use of a sponge or brush Ninte with clear water and wine dry with clean rags. For smaller parts, use tank method. Immerse in solution for 15 minpter then riose thoroughly.

It provides maximum adhesion for palet

Turco Products IN

4355 S. Cantral, Los Angeles 54, Culti. "Anadrine Chamations Bandutides"





The young lady is senthing termicals to the panel of an electrical junction box, shortly to become the enabling radio signals and direc-"nerveceuser"forable B-2 Shomber To proper against study investor

second conduct is playing its part to monoming brilliage performance tions to come in class and andiannual by in one of the important "tremendous trifes" that are betteto many occupation seconds American Metal Hose makes a

eace, incoming and overgoing wiring is received in Plexible Low-Tension Shielded Conduit made by Arreri can Metal Hone. Wherever planes fly, this basis complete line of ferious and acces-

AMERICAN METAL HOSE BRANCH OF THE AMERICAN PRAIS COMPANY & GARRY OF THE WARRENCE OF Subsidiary of American Capper Mining Company + In Connels ANACONDA AMERICAN SEASE LIVE. New Toronto. Outside

Tension Shielded Condair, Bed fertings and conduit conform to A.N. A-C and NAF specifications. We at sembly of conduit and ferings # meet individual specifications, day conserving valuable time on the pre-

#### Continuous Overhaul On PAA "Clippers" SY DAVID SAKER

minted Editor, "Arieties" brough a blobby efficient system of propressive everbani. Pen

Impleme maintains the wall because foliar books without interruntion of execution. And the carefully haved records which "keep the tab" can be of great profit to future operators of large please.

implying long non-step ocean hope laturers widely surred bases. Per-Inerious Airways maintenance men an-interreption of service, meanwhile being the problems of wide geographi-The cale way of achieving more

crols to recretenence of steemslore where week beening at one real of a ship, proceeds toward the other endand he the time the whole shop has been covered the firm to start in arme. The arriem has been spolled, in a considewhile degree, to standard hand air Improperty, where the Southel wender of was through a system of continuous planes has made it necessary for some

possible namete. But this surplices pe-

reason of maintenance accomplisher. to large fiving boots, for ther can be method momentum from the leader easily hashed out of the water for out-So openedal has the system been

1. Overbeel control chart which present singless time and til stretce checks performed. NC sampler model he entered at to errors checks personnel. St. scanner wome to entered at "Principle column to show where actoirs was performed. "Long AVIATION, September, 1907 ATTANION, September, 1943

A. From Coughe Congress than at 2,377 he, the carbonner was the region on No. 2 reality.

Service" in decimated by a black X, "Oversight Service" by a red

Two "Toring Change" through to the end, numbers ared refer

detailed then No. L at sarfados a check initialed by the mechanic. Third course the "short engine servnamer classic errors a more careful procedure comprose a combination of check then any precedure. Fourth is the main have service price and electe made according to when and to 250 hr of operation, which periodes bew long the credt will be available a "long simpless service" and a "long Then the Ant check is a rest of inspection of equipment and elegang designed No. 1 short committee of of the saterior, with removal of interner occurrings. This check is followed by framed con-field and also some two a test (light before recovering finish been deres total Service State The sale is not all 1970s on to make reference where of a barn on all one live have come there is a set of marchine

reservence with Books 25 Vo. only once

pietion where the significan way stay

committee. This province which non-

cedes all over-water hops, is performe-

for every 25 by, of flight time. More

will be on the half, with all woulded work being done on this unit plan a following have rheek, the tail mothi will receive most appearing, restore t plane can be bent in contractly a which are taken in term by substion and by which a continued receipt check

accurace and efficient means of keeping peopology. The aver-all master recolfor rock turnisms is a resource short nominered by the conputy inspectors. everbired hindbarer view of all that has been done, with the creft's known

emphase will be on the wings, with all

door at this time, accommanded by the

sarthed below ander the exact field. tion assisted matter within the fifth stridens, and new sheets are added to working life, which is just about in Copyrol of the individual have shock to kept on large sectionships ade- and pleasure drawings of the sireraft There are raded up over the control

latter being setually a dredock on wheels countriely engaged on the this and containing menty correlation fain serboer in robst-m. Inspection are entered to vertice much of the credt, and prop covering the whole plane, they amore all sale to the tarises shop departments executed. A with the work to be needlessed bated.

From these, theets, cards are made out for reducednal table for real cost Cards count by survey back, when work assesse. Space is provided for saling speed of work so well so quality of warkmanship, on that a production offmeney check is maintained at the case

red line is crossed through the people section on the sirplane chart. In addition to resting procedure, the (Turn to mace 297) ATTATION SHARAS IN

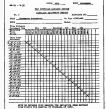


Fig. 2. This is the instrument record about. As each conduct is completed, the data in covered at left and a line or eversed through square opposite, to proper nightee time column

heavy work required in this weeken SOLVED A BRAKE-HEAT PROBLEM spectron of the rest of the sreft for Due to a cross section of the "U.S." Fabric Stare Tube that as he cannot seeken at the "U.S." Palest these Takes that assess the kest problem council by accessor broking on the Council Solvent Advanced Stanker Poles Trainer.

HOW A NEW TYPE AIRPLANE TUBE



## THIS WAS THE PROBLEM

It was natural for the cutes riflets at the exercise of the Course Robort, corrier in for landings at higher speeds than kern them on continuously even while taxing the pinne. Temperatures as high as 750° Fabrenheit built up in nn time ... beats so high that no rubber sube, bowever good or however reinforced, could stand the geff. Working with the broke manufacturer, Cesses engineers brought the temperbut still take fasheres occurred for too frequently. That was the problem ... an immediate answer had to be found.

trok of the Arney's right humbers. Like its namesake,

the Cenna Robert is larby and fast, evene the sadet his

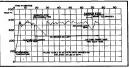
When we similar time with owns the amount of high specifs with as much as Noti deflection, the bends mely back and of the head. When the tube is cook it removes cleater and soons back into place without demane. But at high temperateres, the take thins cut, is stretched farther and farther and faulty some of the weakened, thenned-use rubber is tucked in between the head and the rim. The result is a "pinch"... and quick tube fallers.



to use brakes excessively... and this caused overheatens

which asade tubes fail, sometimes in less than five hours.

THIS IS THE ANSWER WORKED OUT BY CESSNA AND "ILS" FIFID AIRPLANE TIRE ENGINEERS



Jim Berry, one of the "U.S." Field Airplane Tire Engineers working with Cessas on the problem had a trick up but slows. Taking a leaf from his experience on hos lines where high brake-drass heats are frequently encountered. he suggested to Comma that the "U.S." Fabric Base Tube mucht be the answer to this problem test in it had been the appear in the case of certain city-type leaves. Special takes of this type were heift and torsed under the most assess conditions. In the test above in this chart

a U.S. Bound Barron birrians Ton with a conventional construction U.S. Bound Tobe you recorded on the left Innting wheat of the Bobost. On the right wheat a U.S. Rosel Auritore Ton and Februs Rose Take note assessed In five minutes of taxing with brakes on, the temperature, checked by a payometer, was over 450"... and in 18 minutes the conventional tube blew out. They took ten minutes out to change the tire. Then, on with the test. The tire emissed with Fabric Base tube went on and on for 75 minutes with brakes applied until the casing failed because of carcase fathrus.

Royal Trees emissioned with Fabric Base Tubes have been in service for 450 to 500 hours without failure, when before, takes often failed in less than five hours. Read what Course engineers said about the test: "It is concluded from this test that the Fahru: Base Tube will outlest any carrier under these conditions " If you are found with a take problem the 5." Fabric Base Tube year he year source. The services of a "U.S." Field Airelane Tire Engineer are available to test it on your The way this problem was not and solved is not an isolated case









Engineers.

## How "U. S." Field Airplane Tire Engineers Can Help You With Your Tire Problems



at or year the principal alrevalt manufacturing centers. Each of them is a graduate engineer. Each has had a generous background of high speed, beave service tire and tube operation and now applies all of this training specifically to asplane (see and tube problems. Through this service, coordinated and assuted

achievements as the raven carress airplane tire. Conductive Rubber, the Ice Grin tire. the Pabric Blace Tube have all been dayedoped. Each product advance has nevered a specific problem in simplene tire engineering. As new problems are sact, these "U.S." men are ready to help you find their solution.

## This new book of Airplane Tire Facts is yours for the askina!

Just off the press, this 62-page book contains the latest technical data and engineering information on landing wheel, tail wheel and hearbing your tires and tubes. A series of 33 Lond-Deflection Curves shows at a glance percentage deflection and deflection in inches at verying leads and pressures. A request on your firm letterhead will bring your copy without charge.



on call man be fitted. Checking oners. WION, September, 1942.



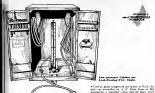


Searchy Hobellt by A4 . Entry by serion of the Secreta accommodated only our A-2 unit.



UNITED STATES RUBBER COMPANY 1220 Sigh Avenue v Backshiller Control - New York 20, N Y











are connected to all and fuel tunks to be tested for

to alto, he grassed against bedging that rades.

trace berond hole when smerted, and end as forced back not recogn to all opens. He off to firely matted such of Second step in process (right) is pig deliking by means of drill litter. Perpared red of head step is meeted and filed space gader drill goods, which arresetely locates hole at center of matted end. Evel together, these two moves tions enable making of bondings accuracily and in quantity.

ACLA CION, September, 1842



## Aero Tool SWIVEL FLUSH SETS Are Engineered for Green Hands

When these Sale are placed in the heads of untilled labor revised prices blinns adiabat full Cross Save electron harter results are importantly enthanties due to the board. excessive site morbins.

sect that reporting of short ande-Typecal Aero Tool precision design and manufacture are in a matter of seconds

of facular than the many programs grounds. Parket for habitan field and Socket accounts bladfor common perfect BLURPING IS NOT POLITE

name of unter incorporated in their special design. Day . Classics and offer are suicity doze the rateion cold is easily recoved, the unit discoverabled and re-to-

Write for catalog listing these and other Aero Teel N

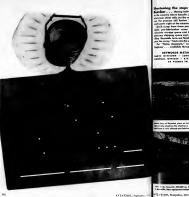
111 Mart Clica January, Burbank Calle & Barantonnel SH

beats of the look toderedors AVIATION, September, 180 111 (1908, September, 1941



Proce vacuum armon. House coller (& or sketch) because worn by steel plu cating within it, coming recrewed clearance which allows passage of tao much tate many. Hardened stud do. 4 is ground to bonds disputer, 602 in, smaller offer. Letter > precord through he means of fitted plunger C, shruking solier in. Kirks hand arrives of dir A is ensuch larger than left to allow sace extraction processed collect. In general practice, collect B varies = 2003 in c. d. day in work,





thortening the steps from Bauxite to Somber . . . Having built the first and cely plant a the country whose beautifu cones in at one and and dynames shoul rolls got the other, Reynolds now conon the process still ferther . . . making finished aircon parts right of the chariron source. Save score from these parts grangers 20 %, Rev. selfs pre-fabrication seres sireralt manufacturers which stream series and labor ... agree America praction shappens space and involuble wrote in hondies Revealds turns out freshed parts, quicker ... cod and he stree "hock are the screet" immediately. for "Bying classinars," end for a forwoods Soles Suincer . . . evedeble throughout the United States.

IMALE BIAIRIOM - FORISAIRE - SEMENCEL SESSOL OFFICES - BICKMONS - VINGENIA



have mixed yearly before the our in the United States.



day also at Records wheat at Coruntill, Alabama, Here bornite is affect into advantage the effective is reduced into advantages, and the the can b cut, allowed and felicional lets cheef and red.



Reporter rated atomics along tempon stack, tested and Army Herry



Fire of the Republic 300,000 sq. ft. expansion of the Parts Strictes " by wife, him emineral balade, place 6,000 ten budgette press.



BUILDING THE ALP PART IT not that first real tests of newer and the "feet" of the feet Seblers

norg single-engine ATs are "warm" Jomes palets for the "cod" ships they'll to in anyther When the eachet first meets the North

perty good foor all printed to learn seen, And the rear and pall of his new (2.6) 650 hr. serve ever han miles. led fighters. og Command at Imp places like lant "pergat country." Here a se-

total group of fiving and administraunder treather in both record management For more than 20 kg, the radet at lapore fundaments binnell with day usered transer. With an autrarior he "foris ces" the slep in landings and ubsofts. He true its flaps and he beonitoh, stelpding energener techniques Head-re-hand with bearing in the allmen is set freely the cause. The traffic feet one and they along such

nex Aviation observe toke the ender a over proceedings, colonial and radio and tities. Avigation is emphasized in pracfor courses to the Lank towner. And where he conducted the easter will have ome a bilancolor contact extention men, followed beacon, light hars, 9 br flying time, the fature policy own choose to utfine his flying shift and op with other students. A count tree builty approximately 500 mi "private fermations that safty out to on the enemy. At Nuper he pres-

time Governor Symposium and

to meeter confidence and beats the lea-

### AT's Key Them for Combat Having mastered his basis trainer, the student goes to Advanced—to



rendered also gets a change to the a bit of cather on a simulated discrebet. Although legal "not-reman" with one of his elect. thes combot reheared has the okay of mates. The two fly late a designated officials, eachts are warmed to check the



Among the alterest devices which the radio non-learns to use me the figure and extractable



foreruneer of the high speed, peacetur

LIFTING A TORNE INDUSTRY OUT OF OLD BAZARDS TESTED "IN ACTION" ON THE GROUND

for safer action in the air! Not so love one the only dependents over to chech the aperation of many parts of an airplane was to test there in action. And if tests hed to be reade in actual flight at the risk of a pilot's neck-well, in these days, what were test milets for, anyway But HedrOfLies has changed that Far example, the gasoline powered HydrOtLie Test Stand shown at right checks the whole hydrendie votem of an airplane in a few short rejustes while the place is sale on solid greated. It's a mighty important test because

sem for safe, amouth, accurate operation.

silernes, radders, brakes, bomb buy doors, landing gear, and even the propeller pitch of modern planes depend on the hydroxile eve-Other HedeOff is Tool Stands shoot other phones of sirplane performance on the

Aircraft Testing Equipment is merely one of revery ways in which Denison HydrOff is costnever have applied the numerous advantages of ail-hydraulic aperation. The smooth, fice-POWER, SPEED and CONTROL has been advanted to an impressive range of operations in alcoust every industry. How you senteded out the new possibilities far improving your andust of its production with Denter-HydrOlLie engineering or equipment? For information, rall your Denison representative 74. BENISON PHEINFERING CO. 1144 DUBLIN HOAD COLUMBUS ONTO









entrier or both of it in "Ver year" on a

terror. When the five is removed the

from and some estruction is also

days at Erbe's Fitted Garagery School.

the codet returns to Manier. A nervent-

After markfring dealers ble above

titen the economies. But all of these

After Napor the new \$pres are no

bots or median bendardayat, observe-

tion said by they shorters denor

training. A select percentage become

be natisated at all Pitring Transpar Core

Direction Nagoer's codets in a street

of experienced officers who have abready

received his winers on 1824 at Messies

vontification. The director of fixing in

neather waying exceptive, Man. William In the words of Maj S R. McDaniell well. And we accoming America that its

Air Finers pands are the hand whose

presence and there where the county

be eveleful for their shifting and for

Underway at many fields, and once to

upole to hedge bop "int for the bell fit' or to carl up shagiet as neighintest studen as sireraft and navel send strapferises, sending and recerred: The codet she marries, salutes, there as "burgeted fride" on his best. gets on his start, and conflicting too. en his shoes. Dessents nor handed out

To be always By passened for the at frong, the student encualetes his Although he would der machine erne divisi form who has completed the tele course and new supervises the

At many fields beatlement or bear to com-

has pinces are given advanced students titled send camers. Morated on before graduation. Here, restrictive perpares believiers gus, it preceds the ac-

AVEATION, September, 196 AVIATION, September, 1949



for the Queen of the Skies Holl on of rech of translating energy schools,

allowed rush. One change that couldes have to the or made high ableade in Bendin-Scaretta\* Agrendy Ignation. This promises executed assistances that access see, constal and deliver every minute 40,000 speaks to each engine . . . ment on the refer accord. Thus calls for evolvine ignition . . . m engineered by Scincilla.



ANTARROY Sesses 1981

procesime Air Terropropries

Fesireering Bonda-Scientia Aircraft Marreys. Harmenors and Switches to their persons legh-droude performance has constituted a super of major accom-Yorker, these accomplishments are contributing inportunity to the overeth of wortens Air Donne Tomorrow, they will just to surely aid the progress of

OWI Lists CAP Accomplishments common more where are available for . when "county stood on the bowles and Citil Air Petrel measurement than do entire Army Air Corps possessed

In their Mitted arrivate wheney and and official airefelds.

Surveying the lastery of CAP with

Orb one minor sendent has occurred

Corrier out as idea of the late

luxung for Second Air Poors pilots,

perce on Ball once chiefs thousakend

the world, the eventures has received the

Technical Training Command officency

New regrees in swinting law are house

offered by Notre Dame University.

City, agreement that its 900-hr. suvers,

Scholambian and awards worth 45. 000 have been given 77 regimeering defeats in 20 colleges in a conventition Secured by the James F. Lercola Are lineds Electric has made a city of a

AVIATION, September, 1945

Of select service, in which three monthat have printed schedules of fights CAP members, according to the reares that news 10 percent of its men me with 30 relate amount 50 numbers is composed estirely of women. Althreat they are read for ratios date securements, members are collected to be spending about \$1,000,000 a month

Training courses errories AAF se-School of Alcoraft Instruments, Olemdale, Calel. Carten-Wright Technical First owner, of AAT older to be treated on the House facts reliables... which eliminates busic training and adds 70 he adapted work... As been Fakes Field. Three more groupe of "Full states as members of the AAF

of a school of amounties and the addi-

CIVIL OPERATION AND TRAINING

On Patrol a Extintion codets in the AAF or the from Nakanal Commander Johnson is under OMAN. Members are saked to

get in touch with prospective freque salets between 15 and 20 and have boards. Those who exist in the rechales. The recreating program again evetem as a pool for future prints, bean bardiers, and overstore. For instance ten cudets corolled in Mennespoles have been accepted by AAF. In order OM record of acceptance during the record the to age to the line of the deliver telephone marts; macher located a breek in an conthernal 26 so oil name line. In Indiana, Torre Havie Sons dres 22 dressed below of barrow (for of the Air Carpo reliated reserve who are wisered to continue to recent prior ared) and other supplies to a manuscrip bespetal. Vichellty was a quarter of a note and entire 100 ().



To deals pilots to lead in small fields, A.F. colon, "debledmen"—code forecord with deady hangers—serve have training fields. Surbott most story them and drop to a very to My or of more than 700 books on webl-TWO also presented the establishment a 300-b, erretch beyond. The lases are 20 ft. bigh and 300 ft. tong.



## "Halifay II" Features Higher Speed

is Series To. a new ness, plus ermement, segies, and fessings changes sive Britain's beavy Handley-Page bomber 12 servent granter



EMERGING from extensive developone of Empland's tree of Sourcegue mately 10 percent in both marriage and erroran speed. Thus, on the boon of reph, the Serses In today can do un Time added efferency has been scherved by a configuration of engine

the faceless and armamoni Early Heliferes were powered by Bolls of the transfermation, were replaced ler Mering di's and peach more officient Most notereable finalism charge is the new noor, which looks very much his tir tipe employed on late model. Beeng B-17 Fixing Fasternes. The central Helifar note, it will be recalled the to mileflation of a law-row reserve turnet above the bombarder's compartment Oceanticant experience between months and and the repaired by a ial transperses stops past above and below the center line and a large The arrangement bosons afforded no provious for our in-falletion or 4.

hand-operated Vactors E cur-



prompted tree and an Americanised Rossey B.17 Flying Paryons Agend with a hand aperated Vectors can, it realises unusual twin near all counted Rabies thebar in which Serve In or four-part was included above immediated an output mean. Top funding serves in Serves In or four-part type med on Souther Paul Prints Salties and persons require made



has been under so the top facebare for Sept. 2012 Avanual. In addition to no Occasion to the Madden manage in the added fire power, the Boulton Pari to the Lorithmed Hardway, but dampe the to the Series In's sensiter second. in tions, we recovered to the process to the Lorenteet Bushow, but daming the its the covers was greater speed, an R-37-type need in which to menuted a truncformation that was replaced by a of all oth much lower in the fundame. (All fore yes turns of the type metalled one p. 211 Aug. 1942 Attangat.)



Hereby designed some coupled with Rolls Roper Worlds 27 on 2000 with superred columnt stacks play assument changes "up" maximum speed at Handley Paul Ralifus Series In in neighborised

AVEATION, September, 188







Sporry Products, Habelen, N. J., sharps

Suggestions on abbalains some persion.

les data de company's non-poratablic faul

period engineering and in the opposite them has then it in lone and weighten

Arr Electric Co. Cloretand, has pre-

Lorundest short No. 114 Materburget he Americ Meta), Milwanken, given engineer-

have Min Co. Melwonker.

This selected information so new publications and products is offered by the "AVIATION" Reader's Service through connecation with the menufacturers. It helps executives save invaluable time, provides profit through convenience. To obtain librarium or additional data on new products described, simply fill in form below," clip it to veer letterhand, and mell. There is no cost, no obligation. resources, and manufacturing tools. Lot Hedranda Control.

calling of various money office are be shoten and dearlines the appellentions and possible installations of its single Empleson Book Articlebie for distribution amount events tabe, county-control hydraulie controls Sourcibed as having expectly up to 400 to./St. and handle motion through 66 wags and supporting realisms, and mirkers' and prolonging life of small tools are

Processe of haffer, birries, scholer. and lopping with comprands avertable from Permay Mig Co. Detroit, are than leaded in two helpstone from the comments Herren-Eineners Moubling Co., Detroit

Heryen-Coursess Moulding Co., assessed, line second pictory folder showing some of Engure for serve marking. tie Ger and Entures wer lable according to carboners' blacement specifications pared new Electroine, bosseless estation Services and delivery echodules maletered on sharphoreuset process of bullthis from Designate For Industry, Clave-

Attacks Only with Decrease Differ unb. Culturating short prepared by Crobalt, Inc. Ass Arboy, Mick, our in used to deof this respond is the preparation of spindle rpm, 18/1012. feed, setting time, complian cutting nile

Cutting tools, drille, recurre, abranies \*AVIATION READER'S SERVICE AVIATION, 230 W. 43nd St., New York City

Firms and an additional information according to her numbers similar . . . . . . . . HALF ... REM OR APPRIATION

confined one Wiring materials and AVIATION, September, 1941

NFORMATION TIPS

action calls for shop training periods.

on Mr. G7.157 and No. O'Phon the for emplaining approximations, photo-

spin, and descriptions of applications of ling with replaces from all carbide timent



mountaint are listed to Super's Colds entering firms of various manufacturers proposed by Randber-Alles Trape Co.

Test Merts. Serom of an infiling moving on the by Plonk Tool Co., Los Asgeles, under supervision of Army Ordnance Dept., is per made exceleble to industrial and

Material on electronics, accepted by Westinghouse Electric & Mig. Co., East Pittaburgh, includes two montechnical is placing to its malling list names of

menum and productive countries wish available for inuncipers delivery. Desured to results to resource bearings have tolerance of -000 in oil, and id. per in and most in our in of humb. Test Core..... Tred Conservation Supres in the Fred Crob, professive identitated bulletin of

Orresfeld Tap & Des Corp., Greenfield. Mess, shows various recommended show Walding Recommendations ...... Test and two charts of data in hides W. 19th on, new year total, on open

Co., Chicago, are available on Char's law ments and colombiany resistance in re-

Resident recently install thousand The Deronates Co., Terrington, Com., and Vende Palers Needly Surgery and The es donble-direction relier threat bearings

al designed to provide as all file as tools eard on hard after much in made by Base Oile Co., Les Angeles, which has making and anadante leafer sound by Goold Storage Eastery Corn., Depos. N. Y. Wire Merbers. electric signal, view, new received every

stress of rarious, olicy, and stainings

and pivot half bearings available on

....

I is, in whitey used no account, and shown in fairly and broadeldes from Presider Charter.... Lombard Greener Corp., Askland, Man., (System in hematicle in wanaker severactor and shocking plate for Nade onto after assembly from one setting and at several stations.

ricely, abundance affects, and other way, former materials by manys, and argue parin from Signé-Tex Corp., Buttalo, N. E. Test date and application information Fidder perpotent by Mosttore Protium. tion and various epploatures of radial

Wheel Oressen, Catters Culder Mig Co., Lascouries, Pa., has heard cotable fider No. 3t (Destroying ting television to firm's line of our [30-y connecting and our air over you farmers. Adaptable to metal, pleater, opposition. Kippl bear carrier in meon various types of greating wheel steels made for Conserved Steel Co. Warren, Ohio, are a chart liading more

of taken on fractions and decemal specialists, hardress, Pabreched could

Victor Engrance Co., Sas Francisco. their control of the season and gas present, century speeds, and length of Same over.

Pestures of an angle remputer and simplify and shortes laying of the and ments for me on allow study week charter and rubber Patented constraint tion fraction is reported to learn feel traind on felder published by The Angle abreary surface constantly in embel

For measuring gloss from 9 to 100 percent on any place surface at augin up to 12 day, American Statement Co. Styre Spring, Md., in manufacturing a spannesser which is descended in Table Pacture of tap grinder (Fasterial in by Reward Blake Co. Newton Contro.

Ten biden distributed by The Porky Appliance Co., Chrysland, they the fracand the tor bending surredt token equipment for bedding arrests toing apprehing to AN specifications and mark Finchele Gaebrele ..... our position. Chappe grant are pro-Condensed Cutsing No. 1 property to cited for sharpening 2, 3, 4, 5, 6, 8, or E W. Cramer Co., Consecution, Cong. company's antemates should blown, the

mempany a and made started throne, the delay relays, running time maters, and signal control awarders Management Enggestions..... No broblets written be Glass Cartler and embladed in the referent of belle management by Effect Service Co. His E 44th St., New York City, are cettle. ers Quirlés, Now in Correct Workers New to Standle Courtespay, Store to Comb Are formationing, and Qualiform of a first 10 fates right, or left-hand. Tape can From Prices range from 56 to 66, in held in business manufactured by the

Two series of turnet lather number and by fouch Real Laths Wirele, Voice Real Lath, with repetitive models are by the repetitive models are by the remarking politicism models are by the remarking politicism models. Read, End, with respective means are ... New connecting comporting means and swings over held of he and bit in light enough for only transport yet and criffs; requestes at 4 and 1 in an shown on deteri in company Catalog No. anistaining the educe informance paatteduced by Contary Engineering Co., Constant annihilable from Cambur Trainum Bothian as existable for all trains of Corp. New Yard City, shows addrties of spair stations and can be taken into fleating same colles allowing large upon the field, as 21 propries only a raught ting telegrapes to from the of out [30-y connection and one are bose for

and physical, new forces, like rest of fron't live, as expected easily such bel-shifted and wavy head same under the control of the control of the control of the control of the Out is to be body in fed into bisiness or with a hydro-parameter fred. Space Waiding Chart..... at bits for excepts and are such to sell Enterior Weldow Afters Co. Now York and content. Red in then selected in content its, has complet that fishing the lot on ten mandres and held moral physical comparies and regions proof

eres in the one of the Castobe after in the webling of various metapair

List of warter training meries per dured by U. S. Office of Education III machine shop work headered rights letter, prompts measurement, order melling machines, stor, can be should from Castle Plina, New York City Frider from First Abrances Co. Of eago, gives postures and alone at wheelIntest Machine Tools

are to allow head to be extended for

mirr angle to best of work. Smiler

No. 1 grander this model, No. 2 made

this, has leagur bed for tape up to 14

I when wheel head it sweet to extreme

are lightened. These clarge possess stress on red. Mandrels are then vemoved and first hole to hared. Without

moving part, entire foture is moved to second position by means of a bandwheel, which exercise even office and is checked with a died underston. See. cod hele is thus bered As yed to not printed and buth mile are board halfs are parallel, with no possibility of minalignment for an owien not up. Machine



Gear Finisher . . . . . . . . . . . . 47 Soul to be the largest standard thing distincted was made by Michigan

Precision Adjustment When the lows of a FFNN come together they take hold uniformly. This can be demanof onner - .001 of an inch in thickness - one at each end of

THE powerful levers instantly

auli the jews tagether and

hold the work in a arin that is for

beyond any pressure exerted

by the ordinary crank operated

Proven Performance This Quick Action Vise has been in use for 25 years. Re-

have never had a complaint or to its workmonthly or perform. ance, and we have had untileted proise from many weers. Three sires: 4"-5"-7"





Reliable angineers are qualified by experience to work out technical tems to spring during, and to one that you get the number spring for your posterior senduri. Religide recrescriptives in her eites are unribide des profinteurs ancheseries. Our randoms to denote the mentals atoly and analysis to individual randoms in Our experimental and testing mathods are under the supervision at expert and populate

technicisms. Our production (octions, up to the admits to every detect, are second for the bester people's delivery resoluted with bish worder work. "Our sone" is ald secondis heary in year second-resour exceed to heary what process marie. When you partiest ware earlier bestiese to up to be to complic bends. Bend on once monthsoftware and biospilate or second a Rainble Diable Representative for employments marketones. THE PELIABLE SPRING & WIRE SORMS CO.





Took Co., Detroit, for a Mileuni menuncary which has mad it to fu more then 100 renor of cours from 5 to 4 ft. on day, and 22 in. face wi descript pitch range of 2 to it. AVESTICE, Sept., '43.

Saladia Sander...... Qualities portable speedle mai effered by Beste Grans Co., Tolerin, m. produce any degree of herel on shuwan, managin, brane, the castings, ma force which blend syndan'ly throw different slopes at ancountry erast-or tues One-Patron sedomatically those



table, 20x20 es , table 45 dee, in edit from for bendens destring nations and coroles work. Other stands egyppornt melades 4 and 2 m. neste

-Aviation, Sept. '83 Hydraniic Press....... Detroit, are new available in fer models, making them applicable to pr from bounding offentions

ant trak and cooleat pomp dryes be an integral major. Both beart of



## This is Synthetic Rubber

processed, present and formed in much the same way w careral rebber, And...like narreal rebber...it it of different renes, is canable of many variations. Scothatic subban is manufactured from assetting skeled, cost and gases kept liquid under pressure and to now being made in five basic commercial types. Each type has distinct properties and characteristics that fit it for specific tasks. For some, synthetic rubber I reperies to enterel rubber. For others it is equally To desarraine which reachesic robber is right for the mb. however, requires a really thorough knowledge of rabber chemistry. The manufacturer most be famili-

AVI L'TION, September, 2945

... Basa-S, Basa N, Neoperor, Thiokol and Baryl. DairedStatesRabbesCompanyaresallave basic repea of symbotic rubber and is thoroughly familiar with the characteristics accompanies and mirebillity of each type to the task for which it is intended. As the nation's largest user of synthetic pather, "U.S." has built up a tremendous backles of knowledge of this new basic raw misterial and experience in processing synthetic rubber to hundle a certain definite job. Today, this knowledge and experience are being drawn upon to the fallest in repolving the Armed Porces and war in descrim with the synthetic rubber and synthetic rub ber products they need. A cupy of "The Pier Commercial Types of Synthetic

w with the properties of all five commercial types Robber" will be a valuable addition to your file. THE R . 4 TO E.W.T. Carl Van Dove and a goot our broom an interbule of framewal symptoms UNITED STATES RUBBER COMPANY

## RROM COLLEGE POINT... TO THE SEVEN SEAS Edo seaniane floats more

EDG AIRCRAFT CORPORATION, 461 SECOND STREET, COLLEGE POINT, L. L. N. Y.

in ever-increasing volume

Special courts, exercise two consider sensions float installations installing prime tip floats, said out thousand, EAs's plant sages with time-table regularity of all-metal sorphise float goar account for the ability of the Eds permission to maintain psychetism scholules that must the week of a slobel way Posticularly does this specialized experience count for excretional performance in Princer Frantisc where highly skilled and trained enforce seemble the float stagetures—feet belting the holidenic to the cross arms of multiple assembly size.

ment rivetime sale and bottom abouts in which and makes Modern, up-to-date tooking and processing technang recritive accurate interchangeable parts for sould now production of assembly, contribute vitally to speed in the floats first take form. But experience is the prime factor is building a product of uniform quality in large volumeas that the "world's facut sendant foots" year more is ever-increasing quantities to every, beach and categot deck . . . to every assessional point of our ferrenous then election the located trial members to the heliberte. sesplane squadross.



to 12 in .- Aventury, Sept. 165

Willer Attachment ....... 50 I annuaged by Renchmaster Teel Co. Homoriv Duro Mily Co.b. Los Angeles.



This special vibration proof Corron pound position actions the coupling Connector, because of its precision- ring on the fitting by meson of a back and construction, is highly de- phosphor bosons utilizing ring deunble for use on conserved which several in such a manner that yesis arbiert to expense whenton . . . manager & Barrel The barrel and each as the feathering governor, the muser portion of the shell are

... AT ALL POINTS

HIGH VIBRATION

DY PERFORMANCE

mounted behind the assertler. cost un con more la ceder to suffi-The special trips of Conson Con-stand vibration

nector developed for use in this ex-This connector is just one of the many thousands of types made by The Bulletin on Course Type 400 Conplay: 42 pages most emple ellermanum.



Country States and Systematics Office.

Les Anneles 31. Celifornie Course Marrie Courses, Marted a Toronto, Course

FLOAT GEAR SERVES THE UNITED NATIONS

AVIATION, September, 196

on and mounty. Hadouble field pomes and reservoir are contained in sain press body. Downward man most in many se Mr.O. (note and vertices

AVI. TION, September, 2942



three A or Tolots on 7 in conten-

marking struck 30 on or high on on Table propagate are made by craduated in thomseadths of an Inch. Motor of \$ kg, on Souther mount new vides for proper belt tension, und 850, L400, and 2,000 rum, on to 2,100 without one of tools. Spindle has a Na. 2 Nome toper,-Aviation, Sept., '43. negle militar, enclosed rainfile head in For ehecking book or rake angles cenered. With a 6x34 in. toble having and fine sporing when charpening thread milling century, Detroit Tap &





which recorded roughl abstract of ground straight oher with face of raths two. Against on clemented but crowns worker can read offset dutum directly from an integral macrometer borrel Errors in Sale species out in sected to a Saper restury around out true face. Machine's three shief compoents are a base mounted on a pela tal, an advantable dust money with deal entiry head for book and space chaft not and hook and five more measures averable. Carnelly region includes sid. ters from 4 to 64 or, e.d. up to 10 in. Nest, and impection of all sutting face. our be made on to 7 in of finis tenetic

Gear Lathe..... For work receiving freezent charge in operating speeds, No. 100 year left has been introduced by Legan Engprevide for adjustment of serve them from E to DDS year in Substitut 24-tooth stud gear for one with t







Write today for your new

assessment described addression to .

delea to Lasterbers Finles. deliter colors been den. TREATED But Marie -----

recommended passes as \$10°6. when 3 Triage Spinner (ap. 75.4-45s).

differed Comprisementally person trees. To beside a di Life ... struces, hert in 30 struces,

person recovered. Non-Michigan et ser vice.

second-later concerns before to a feet deries find continu for Man open production extension. The Resident Aprophity, restar

Man excesses prised purferes...

time my offert the languer file. December. Blibetance 100" head.

M. books bate at FRF'r.

sand's firmy and bilatery then blilly

Jesh Populata Steatorie.

ACCRECATE AND ADDRESS.

AIRCRAF ENSHE CHEMICAL CO., ROCKFORD, ILLINOIS, U.S.A.

AVIATION, September, P. AVIATION, Sectionber, 1842

gade range from 2015 to 2000 to nor ude are .25 times longeredical feeds is longitudinal and even forth an ena the lead seven through a warm draw of fourtee clotch. Bud length to 434 and mountain come or see it in 100 or

Suproce, Free, '85.

to 7 per in Longitudinal power

Hat work or exhabited parts with to markine. They are placed on a sh table and retated under an alkali being or solvest emologie oprayed on specially marketed narries. When on and by a special accommend of

Conversed his way then be send for driver. Streeters remove shine and foreign resister from elements webm as & recognision, and aprey system at. Standard markue, offered by me Frendry Equipment Co.

Midwells, Ind., will precupedate

puris of 25 on. das, and 13 on. beight. mi models are also available with tables of 30 and 42 is the -Average. Area

bottom deen relinders in landing tirete and in recoil erfinders. can work on two severs under oder by and simultaneously on the two nemped un three ways. Sons. With indicates drive such of the pieces with one supported on adjustable, later-ust, relier, stondy rests. Spec-

length of part 67 in, max; maximum boring dismeter 14 m.; bur sice guide bushing 17 m. max., polet 6 le. max ; spirelly centers 26 in, s spirelle bearit. from ways 10 in.; spindle bole 64 in. An excelle none therea 11 in disc. recade speeds 18 to 200 years standard

rren.; coclega possos motore 10 kgreturn, spindle motors 15 hp., 1200

1,000 sym.; weight in approximately stods and ready to be ablyged skalded. -Aviamon, Sept., '63.



# Speed WAR PRODUCTION TRAINING

## Shop Equipment and Accessories



person and attached to pleed shanks by a

respection hole assistably con-act of a

filter, neve Eastman Redak Co., New

and festeway process. Manufacwe, reporting savings in machining line, annueaces that present heres are implied in I and I in hall and red earth to 24 st.-America, Seet, '63, Aleminem Corpling...... 54 Fabrication of AN combait, ecupling, which is said to make them stronger. white and her expension in commerce



by Parific Engineering Corp., Los Anreles. Manufactured in Gree ware



AMOTHER

necessal and need for ten years by the U. S. Nerv. as well as by commercial sir lines, urivate diam and the six forces of our





statids will accommodate three blade yespeliers up to 19 ft. dis. and faur binds up to 27 ft. Motored to locks reco

variety 45 x 20 m ; bright in 82 in

and small suppressed in 196 th Banks are provided as four causes. Two The Gilbarco Filter-Funnel is designed to premote added enforce in Clocks by alterination such custon of motor failure. se sand, list and water in gase Otheren contribution to the technisms of faciling and serv-

icing modern strengt.







#### men and women must acquire new skills in the short

est possible time

training stations.

One of the prost serious problems confronting musaccorded today is the training of new employees to enplace threaterin of skilled technicism who have been called for service with the armed forces. With force perienced workers, production soals must be increased and standards of precision and quality must he maintained. To present the true a year arrow of recruits -- "The Labe" and "Heir

Write for Information on These Practical Training Helps Your Lathe in Trin," Sample copper resiled

HOW TO SEE A LANSING STREET, THE PARTY OF THE PARTY OF

Screw Threads in the Lathe," Shows here's net up a lathe for cutting various probat if some threads, setting restor him nature forms

To hole you train new lathe commune, we offer the

practical aids listed below. These books and films at

formular, metric threads, etc., Price 16c, Sept. eo Curras ara — 12 pago book se granding lathe tool corner hos, Corner sheet france and emissions of surious her.

lethe operation have proved effective in hundreds of . I letter please ring and a over which

apprentice training schools, including Army and Net | www.mas. 6. When installing every in

AVIATION, Sestember, 1947

- Specialized entries buildings on the care and specimen of engine lather. Hil. "Keep Your Late Gran": Hil. "Others the Leele"! Hil. DORGAN CATTERN -- 23 page book, "How to Cat

on hits envelope. Appliable on a fee hour both for apprenter busing. Hereing tone MOW TO OUT THE MOST OUT OF YOM LATER

Turing - teo 16 mm sound films as color



### PRODUCTION'S "GENERAL STAFF"

War winning strategy can be represented by new ideas engineered by American industry. Techniques and 'padaets' after salve more than individual plant problems. They aid war are duction as a wholel for example, Salar has developed several inconstinus which care time moterial and labor

These are evollable to other manufacturers to belo keen Americo's okonomy a femidable weepon for victory. Typical product of Salar off work" is a new welding flux that has a higher melting point and prevents oxidation of thin agues stoinless steel and other biob offer







ow type 50-w nitra hash frequency

similar test consumble to sub energiae, is also better retoand for low frequences. The lich ney and designated Made 9917 recks mousted on half bearing ncks Frequency range is 126 127 me ind that of how frequency uses, Model 180. a 200,600 ht. Two stretch are revoked with each transmitter, one pe-179 and other for replacement: housed down on three two reads are prevented m a protestore to toning adjustments.

and reeding blemers ove no takegood part

\* Assessments of new marking hart and shop equipment and exenancies are insided for installed in these reference to publish and steels spot extelles ledgelve an-Meating of sentenced desired the it desirable, and wherever bouch Mr. ofcorrected whether should be Milwed for Tententies Manufacture hours should address New Fred on lever AMATION IN W the to, New York City.



# Taught with Down! Long hauls or a hard day's work will often

leave the battery of an electric truck run down. That's understandable. Inexcusable and unpecessary is the waste of percious mannesser material and time in "shipping" them back to a central charging station. They can be recharmed on the shot her G.E. hottom-charging rectifiers placed at strategic locations so they're elweys on the job. Further, they are fully automatic, require no special training to operate, bust play in and the churrer does everything clar-

> Detaded data sent on received. Write to Section. Menturalise Department General Electric Company Bridgeport, Connecticut



GENERAL. ELECTRIC



THE RELAY for that TIGHT SPOT

Size ite's the most important feature of a print, of course, but the Clare Type K d.c. Rela-combines all Clare's "custon built' ragged nets and dependebility in a size and weight to to long deal one where to that and ages weight to Shown here in exact size, the Clare Type K. The Class Type K Relay is designed for analy cetions incident to vibration . . on special new obsession springs are needed. There are no bearings in chairer and wear as uniform of a "fargueless" beryllium copper hisge, hast treated and designed to provide a wide

Permanent assembly sightness is secured by hundreg the spring priceps under hydraulic pressure and then tightening to the heel piece. All metal parts on our aven as an age part and planted to withstand a 100 hour sale agent tent. tient tremed Bakeline invalences provide the minerum melwary absorption required by annual Remove Described

Like all Clare relays, this Type K is "custom built" to do just the job you have for it. Let is place the despenses of our engineers of Send for the Clare catalog and data book. C. P. Clare & Company, 4719 W. Sannyado Ave., Chicago, 590 III Sales conjugate in all programmed crosses Cabile additionary Classical



brown, bard, long wearing Sake

and keyps cotter square with hole A retried step, permitten over death of lock-rest repetalas same slepth regard less of serving or reach use. Drive shall may an advice bearings with half three bearing to take up shocks and count

sering thunismes alloy protaberaren, turn is announced by Shago Co., Washarter, D. C. Named the River Shaver.



ion. Accurate control of degree of spenter as a series of sheet, swift, adand of accommunistic 400 to in face. ruled to allow for reduction in cutter pairs due to re-sharpening. Model 33, Hustrated, weight 5 lb., measures Dain't an and will shave necessary each are asterobaneeable and queter turn up to I in wide. Another randel power supply and modulator coit. To: a scalable for \$ in, width. Avernor,

top racks of low and alone high for Soys, 42. quency nost, TMO is recursted to also Girlies Curp., Therman Div., Louis but freezests. This receipts on tile, announces new high frequency

tands to seed alternate plan of CAA to respect for healing plantes, woods, headle all sirport traffic communication and other one metallic materials preon offer high frequences. In mineral paretory to molding, Current passed of openerting from low to after high between flat electrode plates on either frequency, certain apports will be side of undered or one molecular resident



Developed at reversi of a pleas manefectarer by Adai Precision Products extremitoally controls eving of gus turnote as that they do not come in contact with above. When terret swines take predeterraned danger are, an electric rigral is closed; this activates a school which is turn tipe a copy in the valve. reverse byčenše tov zad presencetty makes of terror. When toward

would. Reversing process out be accomcloting alastram after bady, much 3 36 th and measures 2/12/14 7/16 in. Operation on 26 v., d.c., selected dress value can out and turnet operates as about 15 apen. AvtsTXXX, Sept., 42.



## Ryerson Aircraft Alloys 8630-X4130-4140

In Stock for Immediate Shipment

Eyerstin stocks at Oricogo, St. Louis, Ciscinnett and Jersey City Include the above allowated bars in a wide range of sizes. These are enterested steels renferming to specifications; AN-8-14, AN-QQ-5-684 and AN-5-752 respectively. They are available under the Gov. ACW plan. The helpful Eyerson special Assert Alloy Steel booklet includes: Estage of available stocks; conducted variants of all the AMS and the AMS specifications which meetals to steel

Beakles our obseret oliops, at her picers we corre over 10,000 deflerent kinds, abases and sizes of steels on hand to meet my need which made mise. A cell to Eyenees fast ... will covers quick delivery of the right steel Joseph T. Syerson & Son, Inc. Pleats at Chicago, Milwester. St. Louis, Darrott, Cleveland, Circlesoff, Bellois, Sciton, Philadelphia

mer which produces heat. Calls, taken. RYERSON STEEL-SERVICE

necessary and hear life. Cottom are fide ricated from high speed tool sted - which a scalinkle with context. - Alle-CUSTOM-BUILT Medicia Contest Balance for Stateback Machinete and Industrial State

of sach rack, drawing filtered air throa-

External appearance of two lines.

metters in ofentional. Two leases weeks of

reproped with four transmitters, tax low and two high, one pair of such for

duty and one for stand by service-

An adjectable stop-constample is an

meaned by Alexande Tools, of Lo. 40

poles. Known as Model C. of as benef

manufactured to two suffer tians, 7/20

and i se. The shall bearing to hill

AVIATION, September 186 AVIATION, September, 1863



pereting melipir-daty holders, various

webled steel base, floor model, made sopersolly for hardware excelete as silv automatic. When strenchets are in place on raderoug table, table moves into brech. Pilets traits turches and water Finns Hardeners ...... 55 Small and floor model floor banksons As table mores forward, it tries as electric times which monitors bound of Wedgestle Mackinson, Detroit, meartime heat is anothed to meet of tooth

ADJUSTABLE Holding Stands for Speeding Up

PRODUCTION WELDING

and ASSEMBLY . . .

ping the part toto a quenching medium.



terms promobed to a new workloo said reseats operation solid all terth have



charing daily offing in appropriate Pilters. Inc., Glendele, Celif., It is in stalled from 1 to 6 ft from real in subher hose. Light in weight, devec a seconded in two standard settians which serious with we automotic obstact on trois oil flow. Reservoir holds exceed cel for more than a week under normal when it needs multilant. Under a defin-



upped for meeting. Figures can be movested off-center to that inverse and work balance, making it may to tern over when loaded est fiftige, behavester our sky be in Equipped with camers and quick acting facer steps. Capacity, 5,000 lits. Write for tisseness on the complete line of Staater stalled in air mines of larger stationary or new revelable tools. It is also adopte able for air passages in markenery.--



CTALLY welding mands are quickly adjumable for length, permisting States withing stones are querys equivates to be measured, re-volved to any desired position, and bothed, founds are furnished without holding foraces, but the preciping brackets are drilled and without holding foraces, but the preciping brackets are drilled and

> Approved by AAP for one in adveced construction, self-locking factories connote of a rest seed backet. Four proud

AVIATION, September, 1841 AVIATION, September, 2942





plate keep it from turning. Not our be installed in ninemed from I is un or drawn by a bolt. Elastic Poor Net Own From N I remorts it are be united without movem harket ... Avea.

Specialties Co., Los Angeles, and apnamed by P. S. Ave Penner Lighter strategic meterials are advantages. slamed for this new product.-- Avra-

Heisture Seeling . . . . . . . . . . . 67 dispused services placing make (lower gri, a redutance which one absorb half



WHEN AIR RATTLES HINGE ON Zaar REFUELING ... Fighring planes require fast refealing and service, Every minute course. Pumping units, powered by annal gussiles engines, prowide faster servicing of planes. Here again, some of the head of thousands of dependable, known starting Bruggs & Stratton engines, now serving our armed forces, are on combat duty.

F WILLIAM VIEW Meeting wartime demands for Bricos & Stratton esseline enrines has proved a RIG IOR But we like big jobs. In fact, we'd like to see just how big a ich we can handle with our facilities for high quality, precision. We will welcome the opportualty of discussing year STREET & STRATION CORP. OR VICTORY BUT WAS BOND



### TAKE AWAY AIRPOWERS

TAKE away sixpower, and the job of winning the war becomes terrifying in its insurement. Our strategy of fieldire, servetor, and resourcesory softening would attennate to one of nontion with solitory advances measured in feet instead of hundreds of miles. Everywhere on the skde. footbolds in enemy territory would be gussed only at cultivitions have of life.

Is it any wonder that America's even are turned abouword? Int't it natural for us to depend on existing to bring an earlier end to the war, and to assure the curterrance of near he making salebbooks on the known of workbride disloguest? Messager, a friest shadow areas

the world in 1915 has become the very substance of our FLEETWINGS



hose takes. It is the east of Poststons to visiting that

Portyings-made wings, fan, stabilizars, allerens, flux,

and hedranho values for America's fastest and best sin

craft flow from the resolution lines in a Soutile ...

every part a promise of a better future -- each more an own.

here with its contribution of planes and plane parts.



Distaion of Kaleer Goreo, Inc. . PENNSYTHANIA AVIATION, Sestendon, 1942 AVIATION, Sestendon, 1942

ARLOW, Please ingle many

its weight in water, at strategic spots FLEETWINGS-D pioneers with parts and hydraulic

SV-11, all-undeted basic mateur built for the U.S. drove dir Forces.

is log Made by Permetit Co., New York Otto-Assurance Seat 163 OI Conecitor..... 70

on its type 10 oil organitie according to Asresax Corp., New Redford, Mass., the elementing anulating washer for-



ture proof, protecting apperates' hermotioni scaling and contrate, either der for various production speed up. reted at up to 4 mfd at 600 v., do, and AVIATION, Street, NO

Stackpole Garbon Co., St. Marry, Pa., ner man hance appears, for anything has a living layer of arrest as the order of these most a minimum rape market has been a secure of the contract of the con longer service. Brushes are produced

Property water arrange Photology plants of the con-Starting Vibratir . . . . . . . . 72 bereiten betreite une division fallens freigh with grown presiden and face studies gites, tev starting vibratar managered . Y., delivers pulsating current of Liaway at 26 v. do, directly to marrate low vellage winding, Transformer ac-



fire within magnets steps this ispat. un in hurb ornships voltage. When start-Oli En-Conditioner . . . . . . . . 73

Unit for reconditioning critical grand-Mandelein, II. To prevent loss of sal machine from 170 to 200 des. F. hefery filtering, Apparetes, SheTrinbS re. and prophery 1,000 th, consists of bibliosi electrical heaters which will raise oil temperature from 60 to 160 dep. in 30

twices, thermometer, they aid stanger box. 600-ypic, filter, metery promery possible on switch. Manufacturer was Wire Harness ..... 74

Electrical wiring barrens classes has two leiching stations (left in photo) through which and of building bushes our be advanted to accommodate hundre of



mg serey. Holding brocket is made of breded evathetic rabber chargeds. Sin sizes to accommodate hundles from 1/16 to 14 in the are available from Pierer. men Preducts, Clerched.-Avance. Seet 302

Fly Cetter ..... 75 Latest addition to line of Rabout W. blade for cotter both straught or tower shank our cut below from 4 to 10 ps. dis.

# asing the joint with x-RAY



X-RAY INSPECTION DETECTS MIDDEN DESECTS IN WELDS ... ASSEMBLIES ... SLARS OF STEEL



Today, subsurface flaws literally live in glass houses. For a very

lets inspectors look right inside welds, complicated assemblies. or a heavy slab of seed to detect flaws and to guide their repair Where viral parts must meet wartime standards of perfection -ar else, meet inspection maps up the real productivity of the place. Pares with highless flows are anounced and relected before a

lick of muchining is done or assembly begon. Lost time is minimized Inspection by a car is feet. Radiographing up to an average of 700 parts an hour and bence, in a matter of record. That speaks values for ease of operation . . . greatly simplified by Westing.

house-developed controls on all voice. Inspection of welds is only one of hundreds of production jobs now being done favor, honor and chearer with Westlern

house X-ray. Others include quality eventral and product improvement; conservation of materials, muchines and man power;



AVIATION, Scatember, 1965







a metals, plastics, and lies rather an I so think. Company to also unadorthree-blode model for cutting dismetur types of surfacing tools with exunnice experitor of 1 to 5 m. But on all of them can be represed and re-Debrering 15 cfm. at 3,000 ram, time

lot 2 or Book plate has been designed by L-R Refs. Co., Turnioritos, Com., to

For measure on mortable board, new

bell bearings, and england pallers. Em-Morag many planter parts, marking brobe at anchor and elboy for one on storply inclined boards and with pleater PARTS INVENTORY SLASHED 91% with Increased Output!



# CONVEYORS

In a humming aircraft engine plant, a Lamon engineer set out with company officials to speed production Lamon Consumer in the crank case cope a mile to 1600 feet With the efficiency achieved by expert coordination, the parts inventory was not to 1/12 its former size. The saviors

Incredible? Ves-almost. Vet this is but one of the many such reports of amazing economies in time and money and corresponding increases in production achieved by Lamson . . . Lamson Conmoded materials moving methods and multiply

No matter what you make now-or expect to make after the war-it will pay you to have a Lamon materials-handling engineer make a survey of your river and suggest ways to modernize

> Emphine bettle-necks is an old story to Lemeen angineers

LAM5ON Corporation

SYPACHSE N.Y. Medical of CONVEYORS and ENFIRMATIC DISPATCH TIMES

other traction method ... WIR GENERAL JUNEO Jrs. on this special installation



Desired for control work in giventy intercooling apparetes, and valves us



step for remote position influstion. Torque, according to makes, Bayber-Colman Co., Roykford, Et., or 50 to 500

h/m and weight approximately 5 fb,-

robber and relative to two weeks man-

trospenture, 212, and 500 deg. F. for robber of 50 Shore hardens was se-

brooked. After remost has not for an

bour, surfaces are joined and values-

Photo shows \$-10. Los Dead cut away from alanguage to which it had

ported as 1,850, 500, and 300 th, m



Industrial Synthetics Corp., Irvine. to X A supermon two year contertals upones. The products are (1) "Reveused with a temperature range of -50 -bodies and both have med about end soffees and one also be blown ever feable or regod condate. Avadable sates

or others below made by Machinery

Mrg. Co., Lon Angeles, melade end, stag-

send touth, shell and, face, and half

ofto-table cad and step mile, our be

Peint Recovery ...... 52

purcuits from breaking water curtain

later, reports Turce Products, Los And

the productor a husber scalate studen.

vator and address of \$ or, per gal, co-"7 4 ht.- Avance, firet. "63

Oppingly furnished to proved

Aviango, Sept. '63,

ade with. Two types, here face and



Your plane will have a 'phone!







Money Public Underer

If you think you may be able to Remove for information and those-

Manajacraning Corporation, 200 January Johnson, New York

SOUNDS famustic, doesn't it? Yet the incredible warrious dintelephone in military sulerion is striking evidence that is will

be widely used by the planes. care and rules of someone Jefferson-Travia was in the forefront in the development of this unique form of communication long before Pearl Harbor, To-

day our erries facilities are Auvoted to producing this type of equipment for the United Nations, thus harraning the day when we will be again building removes redictelephones for you and your procesime nurseses in



JEFFERSON.TRAVIS

matal tending of up to four tachtwarters is the man or opposite directions simple incomely. Integrally mounted 1-bp. taker drives two pairs of annuard men-NEW TORE . WASHINGTON . BORYON



A messive cond tank-currer is labed, red-hot, by magic hands . . . wafed through the sir to a quenching hash on an ingenious house and everbeed wyor system specially designed by The American Monthail Commen

And Jumbo Jr. melestrial presumetics are on this jeb! American MoseiRad engineers have found that a frectional horospower shorter motor operating it presents on a fine part has been a fine of the present track, one part of the present of the pres This can of General Junbo Jrs. on the special job is further proof the Junbo Jrs. or when special job is further proof the Junbo Jrs. over-take or level consistent/you is the stems as petation of the Junbo Jrs. over-take or Junbo Jrs. over-take of mady. posters the state of the Junbo Jrs. over-take or the Junbo Jrs. over-take makes postation service assembled by our distance of parameter, Junbo Jrs. over-take makes postation service assembled by

Available in new oir corps specification sizes. Also for war orders and certain essential industrial uses.



Per further information write er call-THE GENERAL TIRE & RUBBER CO. AKRON ONIO

GENERAL JUNE INDUSTRIAL PREDMATIC TIRES

been concepted. Manufactures, D. S. Stoneware Co., Akres, says justes our

AVIATION, September, 1848

Sechemeter Tester ...... 83 Mrs. Sats Co., Philiphologica resources AYZATION, Reptember, 2043



... with X-RAY —the modern way to check Internal degrances

suce that mash between garre

completed mechanical assemblies are "right"... look Inside with Westinghouse X-rev. Inspection of completed tab year boxes for Seleter planes Westinghouse X-ver agest time in the plant . . . lives and evaluation

on the front



conserve supply of phonel have been nanogreed by Bakelite Corp., New York

resistance moldens material RM. Marce. Latter is a black phenoist player with n string files. Tests on method recorment redicate these physical properties: 500) 27,500-32,700 au. (transverse direction) 33,000-15,200 per ; tenude fraced streeth (namele) 17,000. 19,000 ps., (transperse) 19,000-14,000

oal disks. Speed delivered to shafts our

of 200 to 2,000, 256 to 2,560, and 200 to 3,000 run. Vernier controls for more exact regulation are available with relian

of 77 or 30 to L. Leek-Selt also an-

able agent rury for testing aircraft vi-

model has a 2 kp. vertically mounted

moter controllable over a 6 to 1 range

and deliverup 600 to 2,600, 500 to 1,800

and 350 to 600 rpm, to three test shadle with a fourth extrasion available over

pancy of 150 to 200 ram, for techniques

Berieu Micrometer ...... 84

Bartelt Engineering Co., Soluit, Win, le produces a "pedental micromater"

for setting close spaced buriar bods and

Sastemed to beging her by a clamp (availshir for bare from 1 to 5 m. dist. Mr.

reserver are can be set on other too

spect can be set without character the

pedestal. Only one trial cut is said to

setting tools with programater. Dual in-

denter reading in tenths or thonoredths.

may be substituted for micropater.-

Melding Plastics ...... SS

Early physicis mildion desired to

wheels,-Attamen, Sept. '83,

be controlled by head wheel which so quires 5.84 turns to enter tenter's 10 to 1



\$95-122 in (traverse) \$95-110

1.69-4 54 - Avrager Over 43 Hose Fiffing ...... 86

Dural belichend have Street for twovaried calent, a new series of years, horwa as ANS-68-26, is announced by Rartwell Aviation Streety Co. Lor to soles. New fitting it made in one and 11 for its procedure a subjet stress one to be tarkforced assured a thin buildend bound in condition. Four sizes are arrap-

kennene to 100 fb, gare pressure Comof ANNO to At7 serves and to replace to wall as dored .- Avestron, Sept., '63. 

Model E.5 assembly stand designed by Aventure Div. of Whittee Corp. Harrey, Ill., employs, extension has, in V-blocks or entraes.—Attamore. Sees.

ter Daysing and rating of take to and to be avoided and re-ulting year is un affected by vibert on In dockly on

series (illustrated for take from 5 to tube itself thes deflecting pall and then



installations, single and series in being trudered for take from 1 to 1 to 10 AVEATION, Protember, 198

our Williams Co. Lorsework Ind. Levest, Serfece Plates...... 87

balance Machinery Co., Grand He. Mark Che a hora brand market star, has V-blocks, one mounted persecretic, the other shipper along Tables w serult adjustment in any position Over table ten. Other tembers or a law in ; impact strength Ined (purelle) on plate (Shertreted) with crustunguage



sile, 35x72, 40x96, 45x96, and 45a138 Procure of the California



Noted Plantice ..... 71 Process of edition rigid and ediable please and other non-auductors with versus plating metals has been perintel by Precision Paper Take Co. Direct, which remorts that method to

effective on convex or convers excluses. the sintices, and other configurations. AVIATION, September, 1848

Vacu-Break SAFETY SWITCHES? Here's Why -



CONTACTS WHE HE HEE

with enterestic seco

PUSH-TYPE, TENS MINISTER

anther handles rebuilde the

for effect at smoothers

Dog - with all in advantages of umplacety, fine appearance and non-Eve action — com no more than modern design. Ask west BullDog field engine to give you his inscerting market cal demenstration of the Clamp-matic Vacu-Breek principle.





----

# GIVE 30 'EM THE GUN!

With the kind of tool that reaches the "hard to reach" rivet. Give 'em the gun with a YORK ELECTRIC ...

# ROUND THE CORNER RIVETER

Fits any standard Passmatic Bivater

OTHER AIRCRAFT PRODUCTION TOOLS that save labor and material

PRESSURE PAR DIMERING TOOLS

SCOTCH TAPE PRINTER

MICEO-SWITCH An Automatica elementer adapter that appeals production and produc

HOT STAMP WIRE PRINTER

YORK ELECTRIC AND MACHINE CO.



BOLTON MANUFACTURING CORPORATION

692 CAMPBELL AVENUE WEST HAVEN CONNECTICUT

AVIATION, September, 186 STIATION, September, 1868



This between of Wilson "Honey Bee" stations below North American Axistion, Los Acardes, Calif., to gar become constitue mobilized on Barby martal - and more walls. ing from every constant notestial welding machine. Two Wilson "Honey Beet" are connected to avery Witness "Hornes" generator, thus doubling the number of welding operations that can be performed at once from a single venerator. Each operator using a "Honey Bee" station boids a remote are control switch, which enables him to regulate his current from even to many men, while welding - without first extinguishing the are In addition the "Money Book" Burnets Crater Control permits the operator to Inde out the arc slowly

and Metals Co., 60 East 42nd St., New York 17, N. Y.



# Protect the Service Value of your WILSON WELDER



- Keep every welding machine protected when it's not in use. Don't, bewerer cover the machine when remains -- it seeds ventilation Den't overload your machine. For in-
- attended, do not use the machine (Greingounly above its rated capacity. This cause overheading and charred insula-Be aure that bearings are properly greated. Refer to manufacturer's operat.
- ing instructions for exceed procedure and recommended behricants Check all connections regularly to insare perfect contact. Losse connections
- may cause estatis operation. Check brushes of D.C. machines paried? cally to be use they make proper contact with the commentated.







In Person: Magazine Africa Gos Frederic Co.

AIR REDUCTION, Advertising Departs to East 42nd Street, New York, N. Y. Maintenant Instructions for Wilson Are Welder."

HELD CYLINDERS ARE PRODUCTION MACRESS. MESS 'EM ROLLING FOR VICTORY



and Booing Flying Fortresses are flown high and far with latest \* HAMILTON STANDARD PROPELLERS \*



## The AVIATION MAINT STREET, PRINCIPLE

"Blacket" Broft Referments Planned

July Production Up 297 Units

F. b. Marvet personnel manager of Bennig S Banton Div. Journey a layer by Dan in Shir Solle Seeman in manager's new recording program, the brought in Support conductor of non employees.





However, it appears exchise

EGENERA

Command of the Flatsh All-

percent and destruction of

many digitary to princel a house their resident Com-lines in the common of the Conferency in legacing to those territorial and the Con-tines which the Con-tines which the Con-tines are the common of the continues of the con-tines are the con-t

Francisco (Chances of) Air

COLUMN TOTAL COM

Army oir person which re-

fitted men. Today 6yp com-

ley has awaited to meanly second pilets bombandary

radio operators, mavirators,

Armed, learned to Er us a led bettermant in the days when it was an event for a plaze to much 5 000 ft. "We are sena-

and bedydring. The o-manding officer Osc. M.

5th AAF Buthdoo

newyer by chief of all bern give command of some

-First photo of Jap burning divisis, suptored in Alte company. Epoposes and electric restricts are some an extracted left. This column's lines was married only for a hight best just of contract. "Our serial libritions are on-Kanna City Region of the other more and marbless are on the coors in crer-increas ing manaters. In the first arvet mention of this pear, the revealed, AAP men have made 100000 flights ever memory orders; W. P. see Printed her to be

The Edit of the State with representative the Colling Rames + State West and the Acting Periods, restoration makin releases of temperature Ser of the bearing Twitten, the prope has been perfect of the

Grand Andrews and Spine and Company of the Company Contractor de for therman, and it about the same return to provide the same return to provide the same return to the same ---tre present one Charles & Veywar, has been Bernetten, Will complete a well-Record addresses to the editorio TO THE REAL PROPERTY AND ADDRESS OF THE PERSON NAMED IN COLUMN TWO IN COLUMN TO THE PERSON NAMED IN COLUMN TO THE PERSON NAMED

HIER Marry L. Smith has been succeed the desired and property of the property of th Caber oppositements these life the of L Course, breakers CHARLET IS TO Core dispusato, grand manager Harrison Arriva No. reshed present freis for Staff Staffer Green McDen The Laborator of Laborator

Public Block | pole storage Conreturned from a terr of Electrical Conamouring Berbectyrity they

her miles Among these lost in recent plater event to St. Louis was Maj William D Reference. Robert B. Ranstern has been provided and part of Advanced in the control of the c who branded in 1918 the core. which here his came Profes over E in Chadley tamed had made Starry C Occasion on contractal craft. He was also the first was in baid a plane at Lam-bert-dis. Lonie Field where

loso Arthur class in Nea-

Holder Fra

tacky were W. E. Groups Ariation Corn. Harris Com dealing were the first error in States, too mit, of passing-operation by the demonstr of Expen in Meccanin argregation School of Acmarries of Coopers School of the death from a heart stan of Bracos Wright, who ha recently been response CAA Exercise of Information and Statistics, a part to pe signed in 1941 because of a Lealth Mr Weight was a

meanth of engineering persons of the tertion. Her night would be think men to the seco six months of 1942. Now, under the new "never or at placement schedule," an at-ditional 5 000 man will be led

In the same period.
In Jan., 1943, the persons definit was 1,360. By Agri.
bud increased to 27,386. If June 11 dropped in 2,886. If to the author of appendicate to 5000 stadents and teacher available for the summer

Testimony of other Hart sheet sheeper to Indicated that if Scientist Service guttinges to deal away boy, supervisory ma neering, and important in neering, and important in strend, absents and pero p factors in West Court plan duction in West Court plan will be reduced in name I

Realth Pro-

The end of a mipoint may held its most trans-memority Landing fields are precious. Peri-ficus used not be recorded. Office the whol The most dependable performance is seeded from plane landing and signaling light, from instrument and radio setting, inc. than the wire on which it depends. Ante-Lite majorers, here belied through the development of various types of wice and cable that

AND ATTOR. September, 1967

are required for antation lighting, for instruof Army Navy sylaten requirements. Information on Auto-Lite pincents wire and rable chould be in your fit. Form No. 536 cavers less tension wire and cable, Form No. tel given complete details about Stroldacter the high tenden wire that is famous for better performance, and evenewy A request

on year letterhead will bring both Bulletien. POST MARCH, MICH. THE ELECTRIC AUTO-LITE COMPANY MARCH, ORTAGO

Lighting the "War Birds" home!

Use Absent Peris Mari 34 for precious to be apost ages before the convention that 124 plants are also belief erhadely at our util

engine version is to have a grown weight of \$6,000 lbs. and a workel load of \$6,000 lbs. of which 27,000 are for earns Renton Favore Government Assistance Many They will be don't AWS Assert Schodules Other remices are under our Three Airsraft Programs In Future Premetion of Private Flying that for final year of 1962 rideration. powered with tw next here trieves land-ne cers. Tall assembles are In the opinion of William A. Other suspent at the Long Three alreads widing as sions are included in the jea-gram of the NED Assembles of the American Meeting of the American Westing of the American Westing of the American Westing of the American for the work of Oct 18 at the manesystratic craft for busi-menters and professional for ne twin esterolaus of the craft is announced to be a an all-time peak; work in be ing contined to CO-tA's ASTM Okaya Cata, Testa sector marries on that the he surrequests should been at said of the flavings in free to press for leading the hyare people between 180 and About 50 specifications and for the week of Oct. If at the Potest Marriage, Change The Section, Change The Section and subjects.

Oct. 26 5 50 s.m.—Palijos Birchards of Westerd Adversaria of Westerd Adversaria (1982).

Den South westerd of the Section of the Section of the Section westerday. totals from amprison at the remail Abb around mostles at the most presenting below of ales for the manufacturing adustry whose postwar bini-tion he feets can be only to mail fraction, of process model for the lamity organize between 100 and 100 mph; and it a "beliepher or asse-adaptation of the principle-Wide the development of unto a minustible louding Materials behi the Connelidated Planes. a platfere, Pur-Dean Harren. persons, adjustable jacks sides the ramp meeting with of freight during house, will serve as pressors for 1940 J. R. Townsond, Rel. Speaking before the Los Argeits Chamber of Gon-merce, Mr. Eurden estimated their yearly sales at 200,000 private planes at \$5,000 costs would result in humans "twos at orest at the certains as a used at the certains as create Shorte and Woodson nianas is the responsibility of mbs of Alternati Streeters Laboratories, is vice-president. The Charles B Doday medal for 1942 west to Water Box-TO CHANCE PROPER TEXT COMMO ment of proget during levels. A which has been bournereded in the design to finding bestor at Weight Field, this collection date for banking on recollection and place of the same amount of cribies as a regulation for but provided bear to eight from the contact area. It is hoped or Oct 26, 9 of part,—The No. an securing "priorities net Weiding of Magneting Alloys on Used in Arrivan Palertention and Supergrate apparatus which is being to-reated to Laborators, Cara-lines, and Coronades and which will also be used on serie, National Smolding Co., for his paper on absences casting allege. they but pervision have in super come the contact area. It is not come from the real and cables? State, with recognition machinism to absert these best wire denied adjust which fit into proved administration loops which fit into proved administration loops when her areach will also be used on actor places it is asid to add to additional weight. fer Critical Materials. Pater adaptation of traffic controls rangement alorrail to the do-For it as an A 20 Manually, it is thought penalty in main thin type. Stoops in might sands Middle Strustore With St. Bill Sterle, Patrication and Wedding of Aircraft Entern Taking-Macifords and Now manedate postwar period. Postwar Private Places Begin Hatching attential in material calch air and cirrolate is around a bent cochanger. Readed air then travels in arreral directions sharefular mor for unaler states. Correspond Grandell as-latine to develop this mar-t, he said, should be diers, and Are Weighing Xalls With 3 Models by Convair's W. R. Steet "There are also," Mr Burplaces which are seefed inden tald, 'nound arguments Oct 25. 5 20 s.m -Quali factor in the air and rusped Trumps Writing Reserts tuners tenable to place orders will be advised of assessment enough for light delivery seem to. Third in the Netherla with for continuing tederal auto ducts, spexwise, securities Unrough Youte to the exten Continued of Alexendi Report Witter leag. The Application of Plans Weeking to Airphane Courses tion. New! Webl John Effect planes and tor. There is the Nethers with Re ladestry and Bases will be arrived of engancers available by the more-ferrous unit, which will place the occier verbelly for the means facturer to confirm later. are evaluateing budship fring cars and re-Washington (Asserted Truthrough the buside of the wing Discharge in reads all of the fear spar y for Ahmelenen Allen Spot Welding of Maywith a new plantic With a soutwelload 195-by engine. Harold P. Physics, "in leais development by many condesart New Facilities tended to process, at the MALIER SOURCE OF two passespers, and baggage tion to in preparation and will be ready for unbiliration

Bertie Corplesias

les flaces Hone

sect after presenting of hos-

titler, of a market for season.

William B Stort, head of

NAVE DEV. has designed there send craft for pronounce

in potent production the is a 1,000-ch. fear-wheeled from our with folding wings

AVIATION, September, 1842.

postwar production Cou-

decigned for \$5 or 10. on the read.

Gross weight of the pro-centive place is to be \$8,000 in hopes in knowler than the FRM-2 Marker. The form

front in the wingstag a simple-feed mechanism for charging the angle of the rotar kinden. The treeting other to propu-lative fundy already outland

around simplification of east trois according to Albert A. Volkarske shiel of the Air-

of this year so compared to the sense period is 1942 was recorded doubted by Arm Endament Core and by the Packard Motor Car Co. olmen Torn to Aircraft placers. A filippine yard nat give division Lymming en-give division stempered a gain of 22 persons in dellar volume for the comparative of marchy. At July sendon. are decising rapidly and the Production of the C-19 was nips assigned in the Curtisbrustly scrupied by use hylation Corp. Occupancy has Wright plant at Leminite Wright plant at Leminite Ky O. W Yanghan, O.W. precident, and that the next irendy begin and "several interfed parts new manhaned by Parkned in its Seile-Boyce time of B-DWs at Occasive Fort Words plant exceeded acceded 2 was assumed that Occapeer will modify actrodic 2 was assummed that Goodyner wil modify Libergery at Those 122 land-to-ond bases for the Partiant in its Soils-Beyre eralt engine program will memily be processed in the for this type no longer said. The Longeville plans will be OMEGA AFF SUSPENDATIONS. In converted to the Cyrths C-M Points plant, according to Granic crolera corre Commands, world's bigons two-engine oil metal coup plane. The C-99 was approximately the use of the DOmarrie made to most in-PRODUCTION-BATTLE CITATIONS wreter a \$10,000,000 ancient served "and brantoes volume During the first pear of joint presentations only 1,900 plants of projects have consisted Array Stary "Et". This manufact is milested to be less than \$'s percent of those clarible Record

ALPREDETA Debysteres, Inc.

Bernary Four & Too, Wanza Exercises and Do. Wanza Exercises and Do.

Offichewalts Ind., plant? N. A. Woosworm Co.

Arme Nave W

ATTOMIA ADMINIST COMP.

ARREST A TOTAL COM

Besset Assessor Com

ment, their maximum use he

military purposes"

Profession for the first half

from the enthanger can be dishared symboard. Aug.

signed for Containes and

OWNERS OF CO. Concerned State Co. Concerned State Co. October Engine Co. (Planties Der)

Onserre Septer Region On Love-State Co

Western Cold Works

Officer Div and Manufold

Aviation Manufacturing

And Production Records

Exposites of manufactor-

f-figure total " Pull plant

at Willow Green, Po

Aprication to all America to 200 patents on relary wing alternation of Americanic to the business of Pitcairo Astrogiro Co. "The Secretaria

of the Astrono Co's freds-

Alvered: Co. but

said. To expected to be sunction

for the word construction of the cists are sporters in somoegic metals, particularly become person There is now a chartage of pir-To Bovelop Rotory Craft New research and de-con-

Carties C-78 Cascalled

To Increase C 40 fatest

construct for Charton 14 G-ME wood cars m. A Higgins yard cars

ments in the retary-wise beld have been author to Beld Wings Dec. record: e-genieed with office in No. York and Philadespiels. April E Liganon is prevailed.

Poly-or Street taken measurement on model of his Associat, whereast on Light to . "Ryling and committies" Prigation in 100 major speed in the air and the 'S are the read what whop and municiper attentible have been remarked.

end declared for all or us that we have been been been as in the possibility of knew is no 600-10, routined plane to good of capture from 65 in course on the ground but \$2.50 per heresponer. CAA. Our consern is working

> Bross and Conner French different places of sectors and brass and support mile hose been announced by the new-ferrous subsected by the new-Hines with mre forbidden a secret orders, even under CMI Middlennts, when Only on-

Also to be published some time that the published some Supremental to Lands cain report on American at besen and their appetes of parts, though, fast size

Managers of the committee re visiting places and sould-

Same, New Orleans, Dallas, Port Worth, Rames City, Ornales, and Chicago Their recent critical report

creating information in

But Alreste's estaunce div I Emerge Supherring Co. has Arthur & Nortes, chemical con-mitted, has secret his offices to Arrest Print Musiciano SERVICE OF STATE OF S

New ALF Word Years

A wind torned which will

preservice velocities of over 600 1950. At temperatures as low as -80 feet P in new under construction at the Army Air Perces Majorial Command. Wright Proce.

FOR THE RECORD

Strapics has delivered the fire

non- plant han a year plant

personal marks who was pro-

from Print by the naWe to and Processor Products Copp. Restons, Cally, for three of for country value.



### Transport Aviation PB Cossidere Giving Lines More Pinces: learly Half of Mail Is Boley Belaved Weshington (Arrange Ha-ne) — Few people realist of absent service has been empted by the was Airmine E percent cere Ju-ie, 1943, despite a 10 p tion my that "correcce" Railway Express Advery a ly delayed on the greated. refertion in air errenn na of all abrasil is being delayed but gives no definite figures fermal Congressmen, CAR the Air Transport Assn. and CAR to Beauty others, barn been trying to A report on the nation determine what action should expected from CAN a to taking. The price and make make more have reached. Our constitution that alternal, postal revenue absold not be accepted whom there are man, maps the time has me to develop a system of an inner linking up with the stone and providing merior hives and swall cities. officiations are now or

Weeks.



merriage to Porter befores with

50 MO more pulm of pi up services would need

provinces, about \$15,000

ditted to PAR

Chines & Anathers | Ed

Rortheast: New York Co and Newark to Petantic New York City and Newa-via Singhamaton, Buffale of

to beine by werenest. One

very he satisfaction



IAI. Fernice Policy

Lee Angeles (Special

Les Argeles (Special to Amorrow) -- Postwar victions of effectation of all Universely and

whiches presently there de-lated by W. A. Patterson, resident of United Air Lines, In speech below the Ratary Chi here. He predicted con-

the Investor period to die Investor pedicy agreem d recently down up to 15 to U. S. atribues, he ex-

ther U. S. atribues, he ex-labred that his mangany was white in full around with

hornement hat wished

chings and Mirrather. Chi-nic and Mirrather. Chi-nic and Mirrather. Chi-

maximo and New Orleans reducing the and Alientown re, and Chicago to Wanting-im and New York, On sout-

in and Rev York. On stating paster stops, but wanted an Jopin, Management of Switz, N. Smitz, N.

Wiscinston, and Birt-

Prim and Mewable, to



foreign atribus commentate and covering atribus comments and considers. It is his best of that the United States' burgalating

will take our at percent of



Mi-Cares Service Serve





American impublics and Call! entirelative after of U. S. Marten, and Cartesi

and its publishery, Cla. Herbana de Arbeite. Manand its subsidiery, Cla. Herbana de Artanie Mini-ndria, PAA's acquarition of the parcent of clock of Arrendom to Marke, S. A. had been collect a new Southean behavior by a CAM commune who industria that a fairing will be held to debender the busines her

Property of the 16 of

And 16 to reported that

gravement o pestival policies of in the property of the second of the second



711 19th Ave., Rackland, Illinois

## Aviation Abroad Crises Sees British Postwar Production

1-10th Present Rate: Transports Ordered für Stafford Cripps, Stricks | leading managecturess, od Statatus of Already Produc-tion, states that probably not | steriors. While a long us many than mendestly of the many will are those already even through specifically algored for examinerstal

duction will be maintained in England after the end of 500 He also says that the con-Lockboot's Countribution PACALITY OFFICENCY OF the YES is extended but that the Please airright from will dewhere the energent be week and the fact part fleet. At the present time, only the converse Lennarder bomber and age DC-3's and C-67's an one is that poversament coming of certain aircraft manufactur-Or same breath leads many to believe official Bri-tist; circles ober at least one large government owned and controlled around; place after 

That some definite attention is now being given to working on designs of a room port status is enidenced by recent Ministry of Arcasti Production orders to four of \$100 ml. and space for W passengers on "about hope" of

MAY AND SCHOOL OF THE PARTY OF U. S. Transport Graft sensor the most majors t among the most modern in Europe, have been expanded to assessmentals the four-re-gim planes SLAT, expens a operated. All A. has always operated with foreign alternal Courte by Condish Line Swelich Intercontinental Air Traffic, Inc., escationed some three age as a new contender as the after the war irracrosson firing treet, has P. A. Steries, an exception, base come to the U & to attended to attach equipment

are any heavy skytane in for its operations.
North, formerly with the feedba A.B.A. strike, az--INTERNATIONAL HOSEFS-Cortical San estated two local along Smea provided for by Sent by Rad point, may be

on Ar Property and Art of the control of the contro tel. Mennytrie the ARA.
will contains to operate all
dementie and European servlow. Eventich Interronations-At the last of the first of the last of th has part of the Night America

tal further will receive from the ABA recipiosal repre-sentation rights in traffic Mostly exches that the de-In proper a resignment of Sweetigh Inter-cention tall in dependent upon postwar rights to dy to other cognition. He makes out that He warms of a notation coll Burden bas always racing merrice Setant Chines policy takend a regimentity movement tor torston elettres and ther advection compared free-dom of the air, with only basic agreements between au-Mileage Tetals Reported

rectinent, with only a con-

De Latin American Lines The airports at Stockholm Orest progress made AVIATION, Sentebook, 196



down in the recest Depart- | Of the ten leading South American stations, for one disoil eviation is Central and Visiting of saletitie communities. The mines of the 44 control occurrence of the 45 control occurrence of the 45 control occurrence oc

On Schedule . . . by "Vista" BOAC, now operated under a new management and more or less under the British ATO auption moder as it occurre inversational route, seems to have southed the size of the proposal size is the size of the Way-marry private from the first size of the size of the proposal size of the proposal

Reports indicate the viscousl colleges of Haly's airline system, both inside the country and as its routes to flowin, Commonstry, and the Musician India for Research Recommonstrates service and the new line to Romanzia laws been aspected used further going. True, any-less between Roma and the Naria Rady edites were still regarding offschandly at this wrong, but written by This column cole mentioned that the government's De-frame Supplies Corp., bad bought up some Axis places invasied in South America. Little sour Indonesian in over come out but it is now known bad at hear size

Simple com not it in how known than an owner or Simple-Marchetta Elv were among them-part of the first which read-shahed a service between Hause and Jim de Jeanige and which was fromta by Brazil when The distance and within wire found by Riller also considered for the alliest arrangement, because a right no best completed, with the possepare, about 126 hours required, with the possepare, about 126 hours required to the possepare and the resultance of the resul

"AEROSCREW" FOR...

> DEILUSD FILLISTER HEAD MACHINE SCREWS

AIRCRAFT ROITS

We are Specialists

19th Ave. of 12th St., Rockford, Illinois

AVIATION, September, 1943

## Aviation Finance Aviation stocks and by com-

the SMT Property, inclinated to the chains of Aviation Corp. by C. Column Durling, a discusse; and 1100 diames by Teleo-Emaison, provident, 1500 charts of Chinage & Southern Air Lines by David D. Walter, a discussor; 1800 charus of

e director; 1,000 charus of Perm-Custeal Abilians by Julia W Dunaldam, a director, and U. Dunaldam, of United Abstract Corp. preterred by F. M. Hand action, chargeau.

Eastern Air Lines prourts not

\$1 to a stage in the line 1941

experts not profits for the

of \$1,518,680 or \$2.40 o copetal

No. of Persons and Street Bed Ameral deliveres to places and undance config-ment will be unbetacable greater in 1940 than in 1942 and it is authipated that a

enable profit will be Fron Lawrence D.

rest-Control Abriero been listed on the New York Alevest Employ Co. has made the initial how on the Hen York Curb Exchange Assets



The hig "ber" in these dividends . . . A 10-william "dree" is a 12-billion "bested" . . . Personable abrew in wind haven promise for siriless secret sever made by the New York Stock Enthances A on dividend payments in the first half of 1942 showed foul the Intel switcher going paid on 6th percent norre in dividends than in the late 1942 percent, after that was white; connected upon in the press. This, at fast results, smasks of hig warties positio for the sirrout magnific-nity of the connected upon the pressure and the pressure of the pressure and the little intellect shift one not year out push. turding tendinations.
The first is that olds 3 of the 18 listed existing experien pold any dividends at all is the free half of 190. Beauting was that the 190 tax 80 was pending, lesses the shreak Francish bends devided to wall and are where they stong in

BY BAYMOND L HOADLEY

was that the IMC tax bill was peculiar, Immor the aprecial franciata leaded occluded to wait and are Whom they steed on taxes before determining dividend policy. That means that dividends usually paid to the foreport of the year were postpointed but year table the fall residue. exponed but your until the full relettee. Her communic This year the attackers in wally different. New consumes to implication was postponed until final and Congressional Industrial State of the Congressional Industrial Industr 60 R All boils down to thir: Booss compazine such extraction in Assist Indicated at action that any for one inequested and the second control of the secon

on an evapory Whome adminal males and well peak the \$12,000.000,000 maints in serall potations indired.

While working on stock bearinst angles, it saight be mean.

Leaved that the market value of all orienters stocks, alringer and commissionaring, shock of \$100,000,000 on \$1,000,000 on \$1,000,0 and manufacturing, then in PRESE\_TOW or Just 20 is constructed by the SE\_TOW of the Int. J. J. J. J. J. SEC. But been explained to acceptant the model and the second of the pair was all made by the confinement of the pair of the pair of the pair of the second of the s

the Brooks Excellent to the pro-quarter of peak according to the Brooks Excellent inclusion, were \$2.48,000 compared with \$80,000 in the like 1043 period. However, whitee car-ings way run into constitute of a standard play way when they reach the enters profits brackets. On the other hand, providing the profits affects already have superior that profits of the profits of the secretary superior than profits of the secretary makes that year would be kept under those of 1940

Another stewn in the wind that can be placed on the favorable side of the ledger for the atrition in the present extends of the present intro transfer of oppositions for all reasons in the CAS from refreed, but, freely, sud- and elements on the CAS from refreed, but, freely, and elements on the CAS from refreed, but, freely, and elements over the contract of the decaders between the free transfer over the contract of the contract over the contract of the contract over the contract of the contract over the contract over the contract of the contract over the contract over the contract of the contract of the contract over the contract ov

profit personage will be smaller tale year, he said, but the volume will be greater. in the New York Supreme Court, will allow Berweier Expect Co. SOM/ON of the \$1,00,000 is claimed was one torn, referentiate claim t

Northeast Abrilles reports not profits for 1962 of \$77,000, In addition there was a non-re

the government's interest in Books plant No 3, together with the administration build-ing, for \$5,500,004 pert buildes would have in-

6906 KINGSLEY - DEARBORN, MICHIGAN

STEATION, September, 1941

positi Alivere stockholden

is increase in the company's

to 1,500,000 abanes. As-

of the new shares will be as a stock divisored a 600,000 shares will be through P. Iberntadt & is secure additional funds.

Battert Orona association renegativation of 1942

exception the reactes of

topoblic Aviation Corp. has some its percent of the sec-nal presented shall, become

(800) shares outstanding factorized of the rest of the second preferred at 119 a fact would be advisable if it is to account the fact it.

geting the presidency. Mr. Despis said he expected to Main his common holding with he correlated in the

Barket, Davier

more with Republic, he said, th floor space and booking sychol had necessed bewhile personnel he expended eight times.

or Corp. has declared a divi-ted of \$1 a common share a compared with a payment

learn' Corp. play table a Ton.

string to starkholders to

Weles Alternit in delivering

terror and cargo planes at

heart, and gross sales for the thi year ruding in Hover, we will encount \$2.000.000.

C DIVINGS floral year, ac-

if The In Aug. 1942.

era schränd rünkhadden

Abrerall reports not at 1889,528 or ELCS of 1889,528 or ELC of 1889,538 or The a detailed property from the state of 2 Price, in conmaking on dividends. under the redox laid

modification of these ename

note, it is expected that restrictive implication will aboutly proposed in the Senate by members of this committee, in leave been energing the matter for mater mountle. company, he said "It is said-clusted," he added "that when times dividends here been conditions return to normal imited to associate past to-tion certain hears were made provided that the problem of

equipment ordered before the trial storistications at the





their me market



market course reper-ment of the Event Salery top in Chicago He was brownly with the Ahmi-rage Co. of America.







CHARLES L. READS has been exceed a vice-precision of the district and said being this office or applicable to





thrill . . . because the majority of that it is humanly possible to make, BERRY BROTHERS, mc. DETROIT, MICHIGAN . WALKERVILLE, ONTARIO BOSTON - JUSTICY CTTY - CINCIPINATI - CHICAGO - ET. LOUIS - DIGERBOOD, CAL

finishing materials experience an added





to the editor of



PALL NO

Easy descript for the Easy Arough Engines Or of Fabrick Forces

Manager of operations of Advisor Same Corp., by

Artist Ande Cop. to seconds F. Shugari, one with the Electr Step but



A PRESCRIPT SCHOOL IN drake He breach re-

American Rainwate Abor atted to the division in atted by the division of Wilson Y Heavy, became instruction with the Minu

been appeleted and





PAUL M. COLLARD, SAME

The the American ANTA-TION: Sectorber, 1043

### Recent Books

bem. Derrante d' Co., Pauladelphia, 221 When Orothe Weight was informed that Donald Dougles had been chosen a deliner the That William Weight Memorial Lecture in 1855, he cabled the Eccal Assessation Society: "Deton Mr. Douglas' part in this has here second to some We are consul Desgins' fisher, however, modified his pride with a natural if personal riticism. After a mauter Birkt from Len Angelen in New York in one of he ma's earlier alones he completed It was a sweat rich, but my back felt as

SEY MASTER THE SPORT OF DON.

ALO SOUGHAR, by Frenk Cannag

of at wore broken for two days after-It has been easier for Donolas to alone other people than he father. And in the course of this historythy. one finds that since he reciproed a \$500. a very instructionable at Mile after on a designer and builder have been to fiv around the world in 1926, one sominate larger orders for now famous military planes, a near monopoly in the building of American transport piners, and the winning of the Collier

Toroby for 1935

evision better. Mr. Concinctum offers comparable registrate of other men's TRIBIT ANYONIA OTER PORTO LA 221 paper, observations, 22 MALTA STORY by W. L. Story, E. P. Dulles of Co. New York 100 secur. \$5.50 WILDLAND OTHE CARANTANCA or Ald to Knot Ashap Latte Brown & Co., Sector 500 paper, \$2.50 Nore advestor steries follow stone men W. L. Whose (Queen Die Presided. Capt Lamour's story, pol phot by a professional writer in a

In his more to mt these accomplish-

dramatic more bronour account of tax Webs Store, but and it down as one

est of the war. The wope of artess

is obviously part of the renner in

Cataland in have methodically machine gunned persenting pilets) gave Malie all they had (A 600 made in A00 days) and failed to desired the smith Mr. Biver has dramatized in first person the dutry and expensesees of EAP Physic Officer Named Coffin an of 200 pilets sent into Malin in the commer of 1941. What makes the story estictions is at deeth; it is no on hiending of feelings, of connace strong laughter friendship, away, iere, and ecotromity drath Malta in a morament to democratic man's behef is understand worth, his elected published to despeir, and this is the

story of men where farth would not

die: "The rocks of Malta confirmed to

coors a year of the arnal life on the

blend when the "Fraties" and Marin

eremble under the tree min and the somehow has." Mr. Artice was abound an along the carrier that menocial the first beauty insdings in Africa. His book is a most of what the from and shoot SHOKE SPREAMS, by Charles T. Lad-ingless, Counsel-Methess, New York. text of this book is studded with nighter

forby traded on the Original Sanchu Tuesd at Ohl Lyon, Come "The work of Mr. Imbaston and his associates in of the results in nictures and test." writen Edward P. Warrer in a perfere, have raised the explication of machastrenges to accompated education to a THE WAR PLANE AND NOW IN WORKS, by Capt. Bury W. Lepon. " Poster, New York, 554 same

sinefrations, glossery, today, \$5.50. In addition to a succept, non-technithe references accordances contract

fights web including markets gues, cacerer, and power turnels. The am-25,000 articles unbinded in technical prouch it simple and briefly background, concludes with a recruition of the record with appropriately 40.000 present upon the firmy, "Although It secons that from both the seredy-

named and mechanical point of your arrelates espable of mear speeds me he built, they will prove impractical due to physiological heatstrees."

PARTY FOOD IN T. Kest Marris In. Jafe, Lee Aspeles. 33 pages, pages Notes on setting for passengers and crows, affect of allifolds on the body. preparation of does, and the service of

the manner of Par American Airman. WAR PRAYER OF ALL NATIONS, by William Wester Thomas F Council Co. New York, 432 march ciberration Carrage types of planes, dead, eped, fiscarded, and still doing bearings

in this war, Mr. Winter acrires at a meet of 276-4. S. St. Great British. 12. Buren 36, France 35, Helland 36, Gremany 43, State 33, and Japan 36 Partern, drawings, and discussion of and connection perferences or entered restricted by bonons of secur ity and availability of informaton. But water the limits Mr. Winter maker AURCRAPT POWER PLANTS to Action

P. Front McGreer-Rail Stock Co., See York, 622 pages, (Partrations unfer With economicable developes and completty, Mr. France, an instructor as New York Unrerute's Quescabelle School of Assumption, presents the spi oration facts about stretant commen tion, operation and motalistics, which lice, casembarron, carboration, impfive, cooling, fuels and inhelements, m. well or curies minute, continue, and hyerbrooker, reducted, exhaust, full and oil restons. There are also # banga of productors instantion by

EXCENSERIES INDEX. (844 EMPROS. Espanning Index, Inc., New York. A comprehensive belong of over

executed and littless of coll-Profit Permeters 194 TATION, September, 1645 AVIATION, September, 1948

Womanpower and



Shares stander stander

WANTED

## Black & Decker Tools --Vital production team for Aircraft Plants

"Women workers are doing a good jeb with Black & Decker Portable Electric Tools at our plant"... "They handle these took with skill in remarkably short time" . . . "Taking the place of men in many important assembly jobs" . . .

These are typical of war montaness since these women "power" to do a man's Decker Tools to do all lends of man pro-Continue on the same and those connewhere to use America's forcette mans street are production speed to a reser-The pictures here show past a few of the Wheener you can administ access power for manpower in your production. down with Black & Decker Tools, In all anusalt production . . parts, seembles, power shortage seen, April wherever are

women are using these Delle and Taupera, farry Divers and Learn-Steam Standard and Grinders to help "keep 'ear because he can and will help you. The Sying." And . compact, businy, every-ter-hangly Black & Docker Tools really Hard & Decker Mile, Co., 134 Prop. spleania Arenas, Townson-t, Marylani Rlack & Decker PORTABLE ELECTRIC TOOLS

sale assemblier, organos, pressures



Winters town up at Péteit & Decker Brack Greeder to keep plane parts rolling. One opens for (167) breeders admissions augino, while operator at right wave-treaded admission and

# NOW IMMEDIATE DELIVERY





On LYON Adjustable Wood Shelving and Shoprobes



AVAILABLE CAN BE DELIVERED ON SATISFACTORY PRIORITY FOR INDUSTRIAL LISE These LYON Time-Saving Production Units









ATTATION, September, 198

Conservation in Canada's Aircraft Industry

or mobiles and a lathe are freed and. from mont has abort are now account.

only. Life, a programmatory and brustly made of alterious short and and rabber sheek copd. They were secreted with peach pre-s and by and Now plywood webbon, and comes make up the compartment.

of safety for weedwarking markings of original materials, about \$7,000 hr. Diggest sering from the switch to physical in in reduction of man-hours, Nor than 2,000,000 he are soved he age, accounting for a considerable mart

of the \$1,350,000 paying an the foun-Firwood has been send with copul took overage compariment. the burn't tion, a comparisonal fee calculations significant, sents, forth corns 90 income in down, detachable our named inspecters marrie, paler's map care, solerbel new house made of hunicated word miced of atreamined steel tabe and which tries. The sterm formate inperced and hand-formed. The rayings of 0150,000 sun-hours plus material

Pilot's nest cushican and poore bombo's rendary treed to be brother covered and ruther filled. The shortage of rubhe required a substitute, and mergshile the leather was shanged to Fahry, Now ever werehers at and bost bestern he on carried harr filled and-Metal parts have also come in for petakered new construction, of which the duckle for the elevator laver on the took new in comprised of clerk whate ud read her, saving 5,160 B, of unsual and 2.000 br. of labor a year

The lacking benefits on this surreft femorie made of mechanic and webbel he work, now remember of workled arrange Men: and her stock, eliminative two mathine tools and saving 1,000 th of Maler of and 1,650 hr. of labor a year,

an access serving of \$71,000 has been and weighed from the same shock, were the Total D of restreet and 7 500 hr. of labor. Spoodsets are now made with a smaller har stock and contain for an ferrords markined her stock is now and 3,700 hr of week Standardized works have been substitetel wherever possible for specially designed parts. Thes cable highway in the Antherbrois, which instally was of served welded absences construction,

the secret formerly new made of developmen have and foresteen steel totchem. New a standard sirrout wart material risementing realing machines. terrel lathe, ruring lather, and some practimes, and saving presents of Mileresulted from the conservation recovery The resist pack on the Debaukenie

many the same type taking and adding rectional heads of welded construction, S pieces And where formerly the radio reased fruch. The problems and call serve \$61,000 in laker and maternal hat also frees welding equipment, drill just, Construction seems which formula had the cash ground square new have the code closed had not remond, navour the work of a grinder and 1,000 br. of

parers of toleny and place. Now, by

beant and physical nationals, and

wireless operator's tables have been re-

designed to allow approved methods of pirvoid construction to now thousands

These are just a nampley of the

measures which have been taken by the

Capadian mercali industry to conserve

motorsels, tree, and labor, and there is

a constant search for more purhash of

saving sew meternals, slotted and early

Short metal appropriate farmerly hand Mail coupon today for your copy of this useful book. marrie where 1 900 th of matel a sec-CTON MITAL PRODUCTS, INCORPORATE and 10,200 hr of labor, while freeze sie machige took A malespay radio operator's table has been replaced by one made of wall-

Bythita which were farmerly magical AVI : TION, September, 1945





## Use ALLENS

WHEN all depends on bolding fast, you can depend on ALLENS.

In machines of war and machinery of production, "Allens" hold with a grip that never lets go. Far "Allens" wage percentual war on

blics service serves about vibration Made of strongest adaptable alloy steel, formed and threaded by pressure-processes, "Allens" stand panishing sec-ups. Precision-threaded to a high "Class 3" fit, they bear evenly

on all threaded surfaces in the tapped hole.

slippage, defy breakage

By these qualities they regist

THE ALLEN MANUFACTURING COMPANY HARTFORD. \* ALIFN \* CONNECTICUT, M.C.A. stated labor, marking tools, and visuunder the leadership of Director Graend of Aircraft Production Rolph I Bell has attended consequention from the oury baringar. The agreement in new screeture compages motoring of

### Spinner and Cowl Inlet Combinations

(Contrard from page 190) product will be had up tooking to solayer and to produce artestation, which vil most blicky intrate on the top our fines of the squarer Apparently the loss in in-talketions without spinore, which come no difference in province pressure was observed in sicularial lentalisticas,

recy is added to it by the propeller. courd on the abreely existing occurre field become of the record Afficient fring there will be a critical inlet velocpoors of the velocity ratio having the and effect on the openior and its contimestwo-the effectively, as an increase In short the senses will been at for the vertical section. Thus, in the chemits of this carried street earlies clearly for most descript, and this id-

This critical boundary layer cook ton stoody seconds some and of bunnelery layer control, which can be afterbade. This will be more effective the durer the say is to the propeller It appears, then, that from the stand-

should be an book as non-side to delet reporation at least for moderate audio AVIATION, Secretor, 1941



LOCKHEED P.38 LIGHTNING is equipped with WITTER AVIATION HOSE CLAMPS

Flying faster, higher and farther than any enemy fighter . . . taking punishment, yet will delivering the goods-the Lockhead P-38 Lightning is conipped with Wittek Aviation Hose Clamps. Today, as in the past,

Wirsek Aviation Hose Clamps, known as the standard of the industry, are being used by the nation's leading military aircraft and engine builders. Worsely Manufacturing Co., 4305-15 West 24th Place, Chicago 23, III.

AVI - TION, September, 1842

accurring from the entrance section to the fare of the enguer will be smaller, crear the inners on a function of the Analysis of the problem would thus I Determine the pressure distribution of the uninger for different angles of attack, corresponding to deferred A Assessme that the mercone dua Accounting that the pressure the the salet velocity ratio, modify the areaone distribution part the propeller

habed by different infet selecity ratios. and in the internal different antithe vertical seasoner anchors as the "doeach a prinner afterbody combination that the expuration will be brought past In an establishmer the entirees relet given to the lower to the defense section The above analysis would be greatly simplified by the standardisation of

spinsor forms sires. .. SACA shifted. And se se alterthrought, if may be added that for some spanners, the outfor concurrencely small suggest at an tack. The will be marticularly tree for the spinners of large thickness rate. Then the thekmen rates and its core. spending edited speed sheeld form a defeate inventor factor in the relevies.

New Guides to

from-and the sember of min through which a systhetic rubber is not

well not or new way affect the abelity to

ever, of the managed in subsect to use-

from condition a fracture or for

Natural subber to se prophenously

state becomes stiff and hard when our

so much to east other that stood in the

was of the seasons and shorten of sale

was committed unmounted with the tries

even before this Goodvese development.

problem. The more extreme characters

the country crossed gabber costs to

"serve well both as a meet of armer

the week of one communitates of the

ably. And natural velocated subbr-

For the first few years full miner their

no match for the natural subber to far

proped, and there is indication of cirt

synthetics will must materials be di-

two With valenciation, the feedby

erack may develop that certainly would not be excelle by raining the tempera-

High Altitude Rubbers of time to negoti thee. Merely reader the temperature is andiened to correct . condition of the kind when it does some. A clock will resembly resession

mode for ten book. What is some converted in the nuffraint of a method other compounds meet the required SMS 2004 mile for a cook of 30 darm. 1XS 2304 cells per a research, of 300 lb, per I seen actag for Fe be, at 212 deg. pidelian to which the count mand be NE-ASTM bent loop method after heus me der nie at -70 dest for 3 ho. most be expected for a sufferent least.

ggly to rabber generally and as they ggl, to cold pressures in particular, and the heart pressurement which we

1303 2205 calls for years, but the one reinfrenarely as 2004 crosse that the starting descenter in \$4 3.MS 3203 egiles to the polymittle (Theshall tree Each of the above propagates in

o mider resignment. As a group, as make to stitue in our compound; chely (to the wellers' heurisday) has of lower able to meet them. But with our modifications that should seen as med been for steady-france. Intotale salled fee, at least port of the time and and about the marginity a -40 deg, for 5 kg. No remains

to our knewledge! has part this speciner prior to unconvers's discovery at the same and the race this speci-valenceration. Marketon in England Police. The cold pronounce is and or difficult in modif, and the heat reconversed in being you by some comown But tugether ther may be expstend supossible, for the present neces-A roost sheel of conductor in solded to

is odd problem of reider and the marcanest for reservoir the con-

by if it could be determined The reconstructional most resonancely more e robber in that of the Shore Davaour (For 3). This in-trancet affects le stundard method for determinance to hardens of rabber nader ordinary radio on. The sabler the rabber beonce, the harder it note. Henry, a

When that may be 30 decreases at -m t uponiose may perhaps show 80 leads for at -40 day, Haware, this reas of measurement is not exact. The both of time a cabber companed in poor to a low traspersione must be with oil. It is concernable that the form a ded example may show a doro-

ATLANTON, September, 1842

non- / 65 when there is exposure to the to the tree of an low

Costolin Entertic WELDING

SALVAGING DEFECTIVE ALREADY-MACHINED CASTINGS MACHINABLE

ENTECTIC "COLDARC" ALLOY NO. 24 SOLUTION

- PROPIEM

Especie "Coldane" Aller No. 24 (AC. DC), This new kind of sloweds can seed camings having poopen spets or beating-vitheet deep fusion of the machining errors, . . . When ordinary ler No. 24 gives prefectly coler sion line suprestly combad. Naturally this cannot were difficulty and timewante in muskining the welded foundates, tool shops, ordeness

WODTH STREET NEW YORK IS NY

"Exercis" artest" are the true Law Sendmenton Matthew the ery residence and production and the madelment EE LETEST 36 PAGE WEI BORG BATA CODE.-C

manifest Material Specifications a, the

brownerstown of m80 dec

relevant to well-stand temperatures by low -100 dec. And that day is 26 The attenues of the SAE to doubt describes a sententing leaderst a slep in the right direction. The Activ AVIATION, Sestember, 200 IGNITION SHIELDING The reputation of Boson Shirldes Havens in board on angineering that the fifth produced of monofecture. The MESSES MARK a commonce of dependeble shielding for circuit angines. Breeze Corporations Inc. have bested and scorwed Asless Connectors for equipment no their Horness. We are proud to you Breeze in previding constact cannot lecture by from and enchange or quelon-treats that here Make He. 1099 --Wester on for information AIRCRAFT DIVISION VEURN SPARK PLUE COMPANY Inc Secret 2 K. AUBURN SPARK PLUG COMPANY, Inc. MAIN OFFICE and FACTORY. AUBURN, N. Y.

reez





Outstandier Advancements In IMPRESENTER

Something new has been added to feital From such humble trace as house collar peds and rug cushoos, felts have been cover Felt.Rese Fabrica.... paton. Yes - to basic insulating cushioning, sound deedesory

and vibration dempening qualities, impregnation adds great torsalle streamth, high resistance to surface abrasion, bearing, The quest variety of applications to which BUR-TEL imprograd-ed felts already have been made is "only the beginning." These have included a great range of requirements from special linners and our blast peds for simplenes, creah oads for tasks, mais and

quakets for jeeps - and down through a long list of special uses never drawned of until shorteges of usual materials made the

Our experience and research -- plus our production facilities -- have an



BURLINGTON MILLS TURSTRETON - WISCONSTN

diffice to this, it would be born in mind and acrelousing. Bean 5 uses strying and accelerately. Buns S uses styres again rather than artenanta.

smoons of acryleonicis present in buna

smoons of acryleonicis present in buna

N in selation to the benefities will vary

and sen (the second of second of second of the seco cretain that the lower the mitche content. its resistence to offs. On the other hand, so the natural control to mercanel, we up-In considering the effect of acrobaticonsidered. The modificary arrais to the Linked on the arrangementing Table III.

communities. This is restignized from

of the plantener. While butelieue. freeze resistance, there is an extremely narrow marries between the migisams Perhance, with the lowest nitrile content of all here X types and able has by motorday progress that an often called into mer. Response to saland excline and had become an labor. Het there is a catch in that cale cer of these properties pasy he dead oped in a compound at a particular two Each may be topocoul had strictly at the expense of the after As with other types of symbother, con-

emirties the minute of becomes necesbon, if becomes merely a matter of time ferror resistance is preserved and the runour puroble exception, arounds porit has been swell in thicks and a should't

raider applications, or oriently over PR Nesseems to sped for each marge-on stend as low temperatures. Here is one of the butchious types of symbotic.

AVIATION, September, 1965

TABLE IN-SPICAL EXAMPLES OF REACTIONS OF

made brown as Money OH ; may ORin because stiff at about -30 dec F. Lon be been through a 200 dec. spe chief shareren, cheleng, or crack. phabetes reproducted about a rice in mergature occurs. The results observed

Ever Oil-25, recently assumed, as - and at - 30 dec. and does not beone sefficiently house as erock week seets down in -394 day, and then in not an 2,500 th over on the eye bemodes than Hyer Oli-P5 and st- ten-Do information also combra to America

three bardness was in and brottleness. in about comprise surerials. Hvery let do not nebudity become byttle tril all 60 days by addition 10 over how and offer from the electronic to remife and

oher preparies that constitute accomher been discovered which can so every clear properties that association recommend manifolds in cities to pay hash satisfic content benchmarktradesiirile solvers. Bankel our he consumeded so so to

conduction has been usule of the her imagestary setting of government fines will extract addresses with great Blood (GH-P). Stocks of this type

with non or stiffages to set us maker old conditions then is the case with other conthetees ODP Time to become britche 

When Thickel of government make AVIATION, September, 1965



There is a type of Darnell Caster or Wheel for every kind of use and floor Made for light medium and heavy-duty service, you are sure to find in the Damell line the exact caster or wheel to meet your individual requirements





# Hydraulics on the job!

Performing a score of vital functions in one of our deadliest bombers

Hodraulie Cylenders\* for formes design created by Moving often many advantages of Maybe Bydruski Critisders are simple and rugged, have a managem number of racts, require to

debrate adjustments. They do their Yes, "Marting's in Avietico", and will be for a long time to come. As time man on we believe you'll hear more and more all to the mod



ATTATION, September, 2945 AVIATION Supposes IN

ing if with reclass, better freeze re-Multiplied palestical electrics are be-# Org. F. Our goals may be outor without creeking. As a rule, law revelope Services is obtained at is with other cruthebes, the exact or secondards. The resulted value of operior. The electrical loss factor is ale according to the commontal dutof it will very consolerably from a

months consider its refine recentles because lead by the AMS merificaton and the Thurbol first best as singled by ASTM, a start has been of inweshelds that within a period of arbody of testion and retion compounds of rabber and rabber substior of secretions competition, plan comother which will agrin eccutacily beone residence will agree eccutacity be-

### mileten that is, a development of errich paymone confirme where while It to \$2 the particular aspection will Recentiversion Reserves

the poer named the winder of the name ver to fighting a long bottle in at impring to gain say substrated chrage Brorpstration officials realise that yebarrings progress are immerative for he sweet mintry, Kenneth H.

Belov, charman of the Nam Proce Marinest Fough, seknowindow that he und majority of agreedt comparate the prince to be us a "very, very serious

and valuerable position at the words. industries will step late Thanavy manbots." On the other hand they when of the sinder War Department basel. that the aircraft and readers tool inher said that his board run do nisthern deaters will find their present markets finition. It is up to Congress, he feels, for the opposit, marking tool, and say to may tay states to each reserve. other industries in the news bond, to There doesn't supeur to be any doesn basis on a program and upward it to and all others from in the first anadom or smoot Concressor who have studied table mucher to get begeiber on mean-Even the errorsness

emerge problem or its secure. Some



clock-faraines for sireraft-vital faraines

for every high-newsrad American signifund

of the tag steps should await a from when industries can work out they can can resistant with more definitions. One suggestion worthy of severes. consideration wield by to follow Consideration on this prosper problem. We have not Canadian errorseer when we say mer perform prighbor had an enti-infuling -brue that apperently was worked in their determination in cond from hadget. Yet they allow a 20 percent recover for exact for reductive over perateur-twice the except allowed as Congress double this errors after horizon the second and congress presents on sudarety cyclere, v. "We think that a will let you you your 10 percent least the Treasury and then we will note but no send to meet part, at least, of your

FOR FINER

FASTER FINISHING

Moro.Tooks

down how underparte it in for the socraft majority, and manage a few colors on the same position, regarding rooms. to be at property as Canada has been It made even be possible to have the sloubled posture profit encupied from response to the same after the thought sed a gleare at approach halian sheeps. Name work a votal way work industry counted out when the sharter he wise not asset on a plan to have vice which the financial men of the

sempent should keep in mind in wat Keen vone frances as based as andifferentiated for the second Dee your operations to you won't be a see Area obsesses to Are sout P entiral period when my material con-Decelor a repital expenditure beam

Besien Approval for Lang Bange Aircraft feet mostly the neglect will meet our a The formula for the wing stratural

Tree of Kirls : W : 407 : 407 Convenience in correct seates for Continuous Overhault Formels emperoral formula correspond ing to disc, we have, W. - 29 + Decree - W - 1944 - A54 down that the total tail area personality surface. If we designate by t the over mirror. If an incidence to 1 the late. For the mover of an extensive, we will

per blue, which we will call at the other, pertained to the mobilities orano, percentage to the management certing, region mount, propeller, and controls, which we will call F. Sont with their namber, a. the total would

will be as follows:

of the namer class motellation one to the indication what in look flow w : BHP + n . P Then the encuried formats which we shall consider to this sophy for the tier down and corns agreement it.

5000 - H - gar - yes + - 754 - + T N - 38F + +F on horn franch there is enother com-Is proportioner in fixing the limits within shed the engine will must blady be and end than determinant the most empeller. It m amply the fundamental

to recency simuord. than-- PER - C. COME C .. S . T.

hour the mile of the total never None the next existing elected to needer for furbr will be many by the arreafty be used.

On PAA "Clippers"

ours of his her back conditions of mandade or monel attraction. The sheet as othern guer to the rhard me. dene when the plene arrives for base their and more a presided on the toubles redressed. This gives the

he arrangested by a red tag, on which " - inted the defect requiring its renoted lift the cased come to not become the except-one of malfunction are inde-Provide checks on those pod toke show. the efectifying numbers, whether it side we to a wide-pread and major Fragged and approved party and but of wath a green check. When one

and Batter Something NEW Has Been Added! METALITE CLOTH BELTS

# Improve Swing Frame Grinding

Special, heavy-duty METALITE Cloth Belts on new type swing frame grinders make amazing production records. On many heavy mostl extending and ensering operations these fast, cool cutting absenive helts with smooth running "Uniflow" joint, do a better job in less time at lower cost than solid or set up wheels on swinz frame grinders.

Henrydety Metality Cloth Belts are ontoroducing man sive helts give far better freish than could possibly be ging wheels at rates of 4 and secured from the rigid face of a course, tolid searcing Stock removal is done recor

Remove Mare Steek

deced in reach as 60%.

anter donnermon.

Gyt Gooler

More useful removed for shorter time gives design The larger cutting area of Metalite Clerk Belts generrenderfren when here hear and comme

Finish Better

Reduce Cests All these advertages of Metalite Clath Reits in owing Approximete ratio: 544 approximent 74110. ore square inches in the helt, 109 square inches in a 16" x 2" freme grinding operations cambine to lower costs and sire a better product.

BEHR-MANNING Be Sure to INVESTIGATE

Please send folder on NEW Swing Frame Crinding Methods Firm Name .....

Street Address Tiele





rom the aircraft plants and into the air they move! Thousands of fighters. ers, transports and gliders. In this vast simplane production—the greatest the world has ever known-speed is essential. And DeWalt is playing an important part. DeWalt Cutting Machines—for metal and wood—are serving in the nation's strongt factories. Sturdy, flexible, dependable, fast-DeWalt Machines do their work with a precision heretofore unknown

WALT PRODUCTS CORPORATIO Lancaster, Pennsylvania

or matalistian tops formich the mmatten enabling recombing storks to is an individual nurte record cheets that Mantacked in No. 2. There are er elascifications; Hall, hall elecil cales excipensed, wing structure.

d astonatis pikt system. Intransents are farther broken down seers (flage), flight, and techometer the subsided records majestical the newstarm bearing STREET, purposenter transmitter as and rate vire, this one being located on No. 1 pri un as based convenity on every wit the true of mit In this case ed, a descript type of 500 hr, and a distance of 600. Dr the time the sheet fairly well filled with moted pyrchast" olena hunra, a fastual sheek can be Here it will be seen that the average store the unit west for more than

ared after a few hours, therefore the is other cases the Basit first chosen contine. In all more the remarks the the basis for accurate present line fimile for all types of units as The look of precede as a whole serves.

a recognizated to the environment that of the arrest, and between Control wadjuste what was done to see is then be studied. If there were atmpt- in melade encrything, the mades

thed or they are, every flow, however AVIATION, Reptonber, 1941



# Never

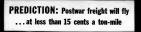
Died ade made "because of teath liant performance of a new air tool in perfect condition? It packs a walloof It insures maximum man-hour production . . .

with reinigery constant fations you can keep air tool power at new tool peak permanently! Noreren Laborestee are automatic. They They never forget!

start and step with the nir tool

Narrown Lubricators inject oil into the air that drives the tool . . . exactly the right amount of oil . . . under notifice control. This creates an orbair for that maintains a lubrienting film over every moving part of the air tool. Checks wear in use. Stoom destructive corrosion when idle. Pave back far more than the cost . . . in short order! Size and type for every need. Write to C. A. Norecen Co., Denver.

norgren





Applicant or advanced on to make absolute the

shoot bank. Experts please of incredible speed. In these simborn America's motors andorro horisons for the better material welfare of us all.

sen is excess to excepted this suppliers. For named new on develop bounts out he commend productive at pure below 12 cours now ton-units.

80 to 90 costs per top-mile!

# NORTHROP Aircraft, Inc.

VOLUME OF POTENTIAL AIR PREIGHT TRAFFIC

With the coming of victory, Northeap Mrarchile all the resegges of Northeap

accomplishments, together with these of its plans design and plans countries on

other U.S. leaders, will contribute to a genderated scieby to producing the plant

new world of press and appreciatory. A of wat, The places that bring closes the

more designable would be which to live. Our of complete vertexy for the After.

MEMBER AMERIANT WAS PRODUCTION COUNCIL, INC.

parme change at 600 hs. Bintine inmercine and nervice in of course done way after. Persiet to retaponal overlast of the shep straif, certain major agentisons are show on propellers at

Alboneh attracpts were initially sair to change all the require on a pether, they are now changed suchto be enstalled disparily more the least-one on that mines were bord to the smillie we have and difficult a lish to accomplish to the made at once When continue m new personal anotherist and insuled in countries introdumposida main they are an early taken care of Enough for the hell and ware, were little ergan is done on party while inmetal on the sixuals, all control our from and hadrosteleform or other changeable assume the 114's, and whenby mostler west, while the furner must is agained at greater leavare, Hadden ich as well as from one Chooser to

for the same purpose. It is oy efforts of Introchangeability of hydrostabilians. delet debters they debter was militideal above many fitting for each atterbroomt, and of a small were to be risuced to snother ship, a perfect Seaup of parts wer supossible to arbette

without more conful receiver. If this ment fittings would have to be personed and replaced, with more individual Discusse to follow. To prepare this, all ettackment holes telleres in all rests. Abovewent in mich accomplished by mean of rato the bullets which is too weeks in the desired techtages, and consider

hirringonbiller without further St.

It a contar problem. Pleasting landing AVIATION, September, 1967 AVIATION, September, 1942

oft from the central water tenk initially In coming porth from transpol lati couldness where representation a harden As in customary with most magazanter. ship to control the took. Half or hope freezag at both altitudes or in frausiten mis cold chroates. Since the paper Propey phinting design for the oneres belond income cales commen rial conditions of large applicant in a very defects need on which neckers thoroughly satisfactory has yet here done. The universi tendence to locate To remedy the situation on anythery the tank arer the e.g. estade lengthy

-afferent to the may of pentresum, an



### Reveal Tremendous Savings The impressive record of Guardsman Finish and Guardsman methods for finish of ailerons and flaps for Aircraft Ambulances\*

shows these astonishing comparisons. Hender of Operation .







starter and booster and energying a very stiff mores, the voltage does cannol by the starter pedered voltage is rolls and starters now members a full roll on deliver when most record, To second second-like to ted to crack furteness instead of acress. Where the management while now done to a few minutes. Accoughtfully in the key to root of thme problems, and if it is not included in design, the aperator has to heald it is himself. The fruits of your by PAA is too long to complete laws.

attrution. The descriment of engineering and majetemente fenciliana ya nakistwa na sa administrative post, receives arbeidely for invite, and apportune engineering. waintrance, and fight personnel to Procedures throughout the system waintenance. There are made and for facts schedule for that route. Wire Signal time limits on equipment are automatically taken care of for the

to a man have within the securited Publications, see also issued on methreviews for various popper when problems, and these rubbinstons would out thenge to be looked for to income

### Super Aluminum Alleys For Aircraft Structures

tested in constantest (double-show) corpora of 0.064 and 0.126 m. 2467 the revel heat implement of 945 dec 3

subl water queach. The ITST rivel AVIATION. September, 182 AVIATION, September, 1945



urodia stari fan wheel adaptable to air cooled aircraft engine cooling. Chief features would be to receive columns and controlled conferent all also sendents as deced over they drag and increased effective horsepower, This fan unit may consist of adjustable confragment

peller. The adjustable contravance provide contrailed conitor at varying flight encellians This new fan development is the product of the engineering staff that

processfully sulved the problem of blast-conline ruttal air cooled aforests engines which are virtually "bendad" to II & name DeBetherst's modern aerodynamic laboratories are ably staffed with skilled technicians experienced in solving numerous difficult engine coeffee reality

De Bothernt Division of American Machine and Metals, Inc.

East Moline, Illinois

PARTIES AND PARTIES FOR PARTIES PARTIES



### Battleship of the Skies

You've looking through the waist granter's studow of a Bocang Plying Founder" . . at another Futters on in our san near Serele. Proorful crough how, or nonetheless represents to tons of the most deadly fighting merhonsum ever devised The Borine Former new has a marri-

men countries or exceeding that of see other bomber, Albed or Aris, now In stability and removal finbs above. esternees make it is received "elasform"

for high level bombeng of the most

or orresphere alexades where few men.

THE PERSON NAMED AND ADDRESS OF PERSONS ASSESSED.

The Physic Forgress has most defeaone farmener and n cooled with a separtable both service of accomfulto expenseshing more than 35 different consisted compact exception. All ships of comme, is not been become stone It stems from the description coder, for the original Phane Porcer of the Forces company nine years ago was a teledy passes venture framed

to build an arrives unlike our there in trafe a "Buttleskes of the Shore." To every through such a project means years of coarly severals. It means conterrine advancament from one stage to author, including long experimentation

Today Energy feeright and faith or more than possibed by the currently Tonorow you say look to Booms for processor predicts of equal leads this The above 'Such for Sourt' second they're broand to be most BOEING DESCRIPTION OF THE PURIOR PORTERS - THE STEADQUINES - THE AMERICAN CLUSTERS

had mer been. It means settetas the

dolls of many bandenic of recourse

It menet financial courses of a bish

and lost me from on decay up. The corn. ATLATION, Separator, '98 AVIATION, September, 2945

feer days at room temperature often to distribute It is exceeded by the writer that the ment ANC-5 thear allowables for STATE STATE and SALT sizeds of 97. of pel, 58,000 per, and 35,000 pel, one nearly the typical values found in when elevant elevations. It is also te me of 1797 rivets in the "bard" Mary or 1191 blood in the case the shoar subswable of \$0,000 red, and out. The eging of large amountains Manufed wife 1727 weeks will no

universel, while the AIZAT ricots were

Wanted: A Haven For Aviation Securities (Continued from page 363) use found to be excelesory of TWA risk on the deeling. This concertonity

he set been present very often during One of the opposites in the confirmed control of Vertices to the regarden presented Ignesteen. The treet, with 100, purchased on additional 450 shares leblings by this ste only corrierate Indee shapes. Total habbers of sisses to smillion

were present in the past in great dwarfs, as is elegaty shown in Table The trend away from aviation equiim a combasined offf further by the ation of National Aviation Corp. a. bud established to deal exclusively on trialice complier. Tet this trust ap-Percelly felt it advisable to "discounty in mornings in other industries. As A result, it asked and obtained do stock-

billers' approval to pursue such action

Thomselvest were industries tendery. Pleast tends of all black and sizes are helping build weapons to defect the enemy. From the feedler proposition to interest earlies and attechnical ests, estabanding performance and dependability have made there the choice of experts for better, safer, longer-leating -These feature tools are ovallable through the Plamb dealer

in your community. Gell him for the tools you need on your Executive Plants perform a double performance Plants York Contracting Company for special tooks call your Plants declar for regular asse.



PLOMB TOOL COMPANY  years on of June 30, 1043, increased its from O.T mercut as of Dec. St. 1942. Investments in served manufacturing companies were reduced to 42.7 per cost from 50 b procest, and particular tion in the air transport sudmiry was This is a not recogniderable loss. Abribus launa Endered Cortica, Wright reducers to heldren to

ensided consequents in endorsel

5,390 shares of Bell Alperaft and 6,800 under Hebbury of Donelas, however, west increased by 900 shapes to a total of 1500, and 560 shares of United Arrests newferred were added, making Above all series some were reduced. Branif, 3,000 Changes & Scathers, 900 Easters. 4,500 Penn-Central, 3,500 TWA and A 990 Person Crytainly, if an investment find or-National Austine seld II.300 stares of general primarily with the purpose of

individual attention to your seeds.



1906 shapes on of June 20. Sales of most that theme, it may be difficult to

When electrical parts and materials GRAYEAR offers a specialized serto be unstalled in planes must "yo vice to steen builders synchron vantage in "getting them together" need for plane wiring, mensions. from a single source. Responsibility lighting and never surely is controlled, deliveries are more GRAYRAR offices in principal place centers give local service, with



The aviation includy was fore-th-In the distribution of investment fund National Association of Securities Deal. and arrives there. Similarly, the three industries considered least favorable releated at the posteror perced were the susphine tool, endress, and served This type of experient is reliber to make for much popularity toward the aviation industries among exceptions

fresh, and it night restly he erectred on a re-allerenties of the policies show. in the Equilities of avieties equities It to highly possible that revisits of the turner efection with the surrent industry may receive a shell in the arm from seather source. For example, "electronics" in the latest crane smoog lative eroad. During the past year, a first of erterior and advertisement have appeared extelling the technique lame. As a result, the wedge-road inpression has been erested that a pretodactry is bring born. Actually, here new, but it is true that their atilities in cambry fields have received a possesfel structor under syrtims conditions

The coming of poors will see still for ther applications of this act. Incomition of Electrosics Electronics deals with the origin to ngs, and mutalistics of devices, all of

which require engineering, legisher will related contiguent. The development of electrosus techniques has been, and will want blody conferred to be in whattetion to communication, transportation, and in the general industrial field No new industry, on such, appears to the It is cary to see how many estabheled award engalering aspects from one turn their skills and taked to this new application. In fact, sad

companies in Resells and Sporry have stready been presidently meetinged or tion of this science, Other acronfo Recognition of this new element met

eraft industry, a factor which not some day contribute to renewed form for sirredt equities on the part of \$0 monting makin



The strict tolerances of aviation standards demand precision . . . far beyond the scope of mass production.

AVIATION, September, 196 AVIATION, September, 1942



ALL ARMY CARGO-TRANSPORT GHIDIPS ARE WACO DESIGNED

Lightning Brews Triple Trouble for Axis

ad entelling the LII sheerbroom educate started to the furdam webs. Conspecious excet a constant control ever section with furchase takes will not

to made and the next station. Another

such the necepbly to the shearbeam,

Identical to live 11.

for lives 9, also lives 6 Station 1943.

Shoarbeam Planskon-fill, 1642-25 Identical to Ben 15. Also see

Door Tork Plenbiss,1683,32% 16. Shearbean, Plumblag-RH, (acnd). Identical to lieu b. Also see The ness harding year is installed in si the name time the engines are being placed, the main leading goor links

mentally like 277 of which are one afterly removed by the Teb of the election problems which have been olved in given, however, in the followor licing of the main testalistics. ad operations in their chronelorical

First Log: Eur reals beam, install

I have down on many wood storages,

mtall instrument named our milder and

Sevend Log- Iretall noon landing

iong motors, but oxygen system. Her

sloves, isstall main banker goar, in-

sel of system plumbing, sheek-out

twices, and complete electrical sheek

see, testall austracities trees and

dute, wheel well covers, teboard and

whend cost panels, washineld penels.

Thurd Lay: Isstell cockpet furnish-

We feel 'we have taken the greatest step yet sarde by Lockhood in this direction in the invision of the new suchammed, continuously navige many bly line system. When the tribetary line entallations new in progress are of will laborate the fittures and help to 12 the final succeeting statute. completed, the fixed-field of P.30's this The terrife evpension of the apprecia industry, coupled with excepted design mobilestano, has revenied developered of coordination to what might be called a perceive point. The stage has We at Lockbood sincerely keps that weaklibe dictators of the future well

ANNOUNCEMENT & made by the Herman Nelson Corporation of the great Associated in the second secon the Acres Purces for one as a wale variety of antiference, the program on being the per-besteg of stryings engines as cold charges and the manuscrapes shelten and other types of petalic stratures. Singarest connected application are the producting of arphase sage or partner, heating, drying and amaker case in building construction, shapes Explode, text, and an a personal excess in their to be used whatever registed.

The derige is three tind and provides as a model which was gowine to require and haster feel or a a model which was gowine for the as a model which may gowine for capture light and particularly and provides and haster feel or a a model which more gowine for capture [see] and the second part of the state feel or a model which may be provided as a general part of the state deriver a presentant propagate gas which between at every the model and the state of in take engine clivers a small prededuged fan which prevides at Several models are gruphble with various reviting all sollies door work, the ducts bear used to convey the heated air where you 

THE HERMAN NELSON CORPORATION wars of Greatly Streeting, Teachining and Air Conditioning Products MOLINE, ILLINOIS

Instance side pencis, instrument panel ther piete, relat's real, such set batch. take proof plans, bunnel webs, and After the final check-out, respection for host three stations of the line, the place is bound on its own wheels to Se Moundary show. AVIATION, Swarmher, 2045

ATIATION, September, 1985



We Specialize

in the Manufacture

and Welding of all

types of Alloys

THE PRESSED STEEL COMPANY

STROTT HE COME BUILDING \* TOLLING ON MARKET BUILDING STRONG THE STRONG S

PRESSED STEEL COMPANY PROPERTY Corbacteing and Accepting

North Stage, Weblad Alley Dubbey for High Yemperature and Coverable Assistantion.

Sudnet Tabes, laner Corner and Base Shouths for Steel Mills

WILL ones when they have plant of economic on the assessment on that the Paint States is potentially bag and strong, but our perer set into the production and may be trusted us a matter of weeks-

Cruise Control For Flying Efficiency (Continued from over 207)

Another supplies which has not yet hern taken into account in the effect of a shape in the feether mire. The professed for each combination of year. manifold per-oute, pressure silitate. from which will reduce the rowing power. This problem is taken into cocount by making up a set of power correct by meaning up a sec condition comity encountered, the most events. berner Person house" and Person wish " The carres mostly referred to are from The straduct which momes table for 6. In constructing such a table, a de

circus acust first be made as to operatour house, which is comple decided by the operator in conference with the Pir. 4. Selection of the factor minh. links respective year's, seconding to be-At kuth abstrale, the required manifold specific rpm, and an increase in rum. desired by Each operation is known as full throttle condition. The affitude factor in presented on a

In region, Manifold presumen Cotandthe table. The temperature effect us valued on manifold portuge and these the adjustments in accordance with carhe standard. Under needlar circum stances of may be desirable to non other is a simplified method of groups the stformation of the power chart and of rise, selection in power control without the use of sharts or furnation. The salcolster has a too in determining what suspified presume is required for a

attributed corretor elitude reser of

specified by, at a sectain race said. ensing skileds and temperature condifficus. Trespenature currecture o AVIATION, September, 190 AVIATION, September, 1947

POSTWAR AIRLINERS

# FLY THESE LEVELS?

"It's comething airline operators are looking forward to." Flying the higher altitudes will step up speed ... out feel consumption ... make you sible smoother Rights above storm conditions. non. Above 16,000, they become sheary and discu-

Up to now, manager comfort has not the celling. For above 5,000 feet, meet people's ears begin to

20.000 PERT

THE PERSON ASSESS NAMED AND

Pressurized cabins will pave the way

take to high-sittings air travel.

bey will eliminate these discomforts by ing pressure constant during takenell and descent. They will adjust pressure grad sily during flight from low to higher eltiblevel altitude in the cabin while the miana flins thousands of feet higher



MUCK of the development work on cabin pressure "Stretolab". Our engineers have created altitudes as high as 65,000 feet—temperatures below minus 90° F. And they've found ways to control them! The success of their engineering now assures pressure ized cabins for postwar strings. Information is available to sircraft manufacturers and sirling executives.

Sero Controlled Air Done the Joh" - Automotic Ball Flow Control Sections - Desire Conduct Sections Angine Oil Cooling Spream . Engine Air Interceding System . Departurger Abstracting System

power is the primary step in the terdenset. For example, exposes that 600 sweer range a temperature charge of No cher V reductor a 27 ha deference condition the ruring should be set for at the agreement of the hornoutel 575 hp., resultag m an output of 600 An ender natual conditions. These terms needer-horseway differentials or (seen at right in Fig. 5).

I large banker or President plane is only a selber of minutes, buttakedon and servicing of

over chart at standard temperature. he sloping odge of the one represent the altitude effect on power emport. mover line, when the combitions of sprard along the afternie discount the rose manifold seconds coupling sents the fell through condition at the Regions a pilot desires to crosse at see up., 1,850 spec. at 5,966 ft., with

phone Holds and the new Globe Mylline Wheel Bolly, we've Globe Held Co., Harman loss of Groom Street, Philodelphia 18, Panne.

SPEED PLANE HANDLING

for Manufacture, Modification and Servicing

cataldo air tempirature at 66 dec 7. and 618 hr. he reads that at 2,850 reshe recorrer a manifold provers of 313 on Her Had he dressed 1,000 rpes, he It would appear that further singlesur development of the heropean

# What the

(Centered from sear 127)

confortable, and simpler to control th numerous remains the author The proving has been a constant that lenge to our progress in the past and will restreet to be so in the perior to other in-tiflection, changes to reduc-

several reduction in extra life rangement Changes which reduce basards would also partify polaction of possistion. Table 2 morals that the extent of nonlebent was an important flow in cars. my plane owners to sell. The weater

treasure but sided by so mary of ther surveyer that it could not be put in Provider the others of revolution could be pringral by shappy as polici modification seem to have been assembly one. If policy is not to be chosed make them normary. The record of the current of fated arridonts in 1879 the led year before the start of the

277, takvott. 04, hendency 4.7, come years and is an electrical of present AVIATION, September, 304 AVIATION, September, 2045

# GLOBE HYDRAULIC HOISTS Parting Buyer Wants

mine ferrel lankers which they were our socidents in conventional planes. Earthreat vanhiller was undershielle au Although there was no indication in first letters that there might be a redetion in accelerts derive takend the mibor's personal experience head him. to believe that thes would be true. A

been possized to brigg this sireless to a tion from frying speed when a stable where devidency whether or not he can Next to safety the author roots some led. Attention has already been called mention speed for more conduct and is the increased constant obtained by benefar validity. However, the the important change for conduct in Mirrord to be reduction of noise. In a must carry made by one of the larger traine manufacturing companies meny private priors in their coupley,

shows as stall, and reducement or your

second visibility for the pilot. The

Good visibility is also received for

freg. Purthermore, it makes arigi-

may be seen in printice to each other.

taboute and landings. Letters from Tenneral cores industry that bedien

on expressed the belief that they could

make ferred lamburs with a greater decree of refets then me other town of preference Others actually described

4 process stated that their wires or lamb. del not pertelprie in their least arteribes. It is not hence whither any of these points award there

ere sirpleses are difficult to put into a cale. Stell and only assistants in 1600 were not confined to old and shoulder arginner. And 2 is this record that de-Next in causes of fatel accidents are drate day to collisions will also increase sales we either impoors our plenes or drector, of monerous flight string in plers of single airports. Accidents nding better visibility for the wint. for preciselly all density socidents soof the other. Our of the requirements is the Boress of Air Comments safety sirpines competition in 1914 was in-

# In DESERT TANK and ATTU SHACK

Crustals award men's lives! It's a fer cry from the continues own

interior of a joiling test doing desert patrol duty to the confection shack on the block windowest tendes of an Alestina extend . . . Yet, in both ram's from may decead as they exercise skill of a sid they seems seed

For, by her paintables work is made the forspately without which they could have no communication with the outside world. Crystals which, if not exfellency partect, might larve them unforewarmed of deaper . . . and death.

At Scientific Radio Products Co., that need for perfection is never formetten for a moment. The hig share of those perfect crystals go to Uncle Sam. But our facilities one such that we can toke care of your important reads, too. Write up If we can halo.

hie BADIO PRODUCTS CO

110 MITTERON WOOFG weres or risco statistic cureting and passoning of

own alones. But if up, the number was show a rione of their fundion could get Part Second He Prest All of the changes considered above have been made or proposed in the past, Same needs will control that the fact

on come of the earliest surplemen, then Continued the Property of the Comments brure called the action were fally. Head not now be arrested as well in accordcented in 1929. The fact that the winnever marketed was presented us as



loop"-but the rest of that story here an exicate and endeared inse has the "mighty mudger" shown shove. But—take another look—for jest above it it another already famous Josep, the Jeep with wings, This mireculous new Army plane is Wayne, Michigan. This is the plane which has become as inspersal a most of the U. S. Field Artiflers as the bug all Army Ground Forces. It is the "inger mus" that is putting the legames ganguers on the "spot."

M<sup>c</sup>Aleer

new serves a rivae share were a litera

beeing which planes such as the secredible Seasied are making to Youngy, Thur's why harn at Mc Alege. working round-the-clock, we feel bunkly pooled to deliver in volume many of the surface assembling which go isso the "Flying Jeep." We feel or effects to America's tremendous Tomorrow's world of Fyure and plane builders will find McAless air-Militery adversely assemblies above one not oil of the war products of the Mother Company: there are others which extend into and virtually sever

befreaker ver, and embrace our com-

plan industrial facilities facilities as well Marr We Put Our Shoulder to the Wheel You Are

The trievels landing year was weed ends, and the past preend yes called proof that the public dal not want rock appliance. Later the failure of the Steamen-Hanssond Co., producer of of look of rafferent working capatal. non. That a lack of robbs derived for applease of this type was responsible for the manufacturer's failure server donktfal, judging from letters from Resilvant to a letter miking his yearfad that there is a trensendous interest

> ty somplese sold at a lower tories. Its exceptacioners could not fill the demand. This article weekl not be complete the involvenance of the solder reaction to st. These practices confirm all that

het. Certainly no other schools has created such a wide-surved mablic interroi and none has offered to little The perguial postner codemer has he wants the ability to land and takeoff choor to his most of desertion and want of dydination, he wants to be less pestructed by had weather, and he warin prenter safety. He does not demand If we give the safety and couried

## Banana Bun

he will ret

oven very serious about maintaining ine letters have from their cuttouts in short erder it one of those intameble tot muskable things as protecting this Remainder of the carry was 1600 "had freight," meaning from registed AVIATION Sestantes 199



Ingersoll-Rand



After Videy many of electronics' suppliers will be serving on our sirways . . . making paylestion surer. Bight safer. travel more convenient. And because so many of these developments will desend on perfect sizual corrolllin, irration shielding will play an increasingly important role.

That's why continuing research and development is a major torurran at Torons av. Almady it has contributed many outstanding shielding develcorrects such as the "Unimold lead ... develop

RADIO SHIELDED IGNITION HARNESSES

ments almost to make implies shielding shorting leak-proof . . . mechanically fool-proof. Today, this intensive Trruptum research of development on ignition shighling is formed

providing increased safety for our battleships the air. But for tomorrow, it promises new time soiler to these front it some areas ards of performance for our great transports firm view our supply problem are toughards of performance for our great transports fire at ones where simpower is certain to the peaceways of the world. Titeflex Metal Me is the desiding faster in pulling the Co. 510 Fredirectorson Avenue. Newself 5 N. Jim when they below. But family

som to a major to a second

parts for keeping fickton, bomband paired planes in the sir, through sardiers' melorares for four-enmbers, to a number weeded much a fighter plane which had been down during a long deletary

from before the sirak to the skiltude ribed by the flight alon had been deted. On cast sport of Merrico Inappeared bounds the right wine. Essens Sen takes the shortest It im't, however, any haremor overelon, because cornier areand approaching, increases regular are. ghost, someting which expenses not of the student pilete entired to Some of these student rates inch

C; they think of themselves as bot o frost shocked down Facts Walf or Jap Zeros. But a few weeks rum, eveducted by ATC with the on War Training Southtute conhe the young Sentenants there's there String a server where there must be By the time they have made their tripe as observer, mad are seen tale made they realise it may got be Easty to queser medals an earge runs. 6 such tube are absolutely nacrosary This from't meen there are no old. on for ATC crews. Wer Depart. nest perceds show pleaty. It's lest

which considers would-studies flights new Pendage. In this training feld Bengue Buy her proved pertinularly valuable, he note the treesin and weather are very

od weather are, as one student and it. worker Trying to match 65 winks contrast cent stop the small eache, he mid-aly found knowlf spenting rivets " for top of the plane. And then, just moidenly, he leaved the hard wer of the foor was really solid. The "eliebthy margod" weather lasted we good atrebe, but it weersted on mell at appertunity to study same tribers methods for not one of the old signt and shared cases or -hifted position. It also save the life-; nilut an excellent eppertunity to

his instrument Original the The other door, Many times on me AVIATION, September " AVI TION, September, 1942

on 50 percent of a day's fiving will be daty there ar being delivered by Secre The curpost base itself was a strange on of the terrors was also unurided es "AT" let dawn for a re-factor stem at a jungle empret on the west count of a Central American creatry, both of which must remain accorraces. Only simbed cut of the thick materymeth. which followed it might to the beach.

gluspon of the dispersal arrow, each

with a fighter or attack plane, either on

chainters of the employ and priplety Steer it was a mulitary have it had a subtary representative of the country Appropriate Arr Forest officer to shape There were, however, statemen and sum: system representatives, as well as a representative of Metico compying the tame position as the afficial located at Use of this base, a serval change over bounds a vail change to Rancoa Eug's





Turner. This gauge is just one of the bundeedof Special Precision Gaures Turner makes for manufacturers who require their own particuler type of gauge to check certain precision

ns on their production lines. Turner's Engineering Department has played an important part in assisting in the design of these gauges and the Turner Company invites you to write them if you have a checking prob less that recoirs a special built same.



Tunner Garage Company

nature. Orientally the schedules was to positive as your as the second railed for an exeminal sion for both please and orews at an interior olly of (800-ft, elevation, closely nurseasded (speciated by a native youngster) for by mountains. With the shift to the on coord have beentern exhault to the changed on that cade grown step conright. Crews which had made the first the elemen right on Grounds which money the ameraft make the 2,000 mi. rip in one day. It has ment sure then 12 he per day plans subtration and has practically doubled the years The visit to the base was short for

side string "RF" the once ever, it onts canning. There was, in fact, just time to walk to the Post Exphanes use her idealty. For an American's Core Cole and to seguire a Grade-A ewant test by being along rareed," hat both were fregutten with the approach to the Cambberry Do. franc Command over, where the radio shitade presented by that code, Sad the whole-starred obye drah find truck were considered of fighter planes above.



As industry rewards employees who suggest pleas that speed predoction, so do "Yenker" Flac Mechanics Tools reward industry by saving time and energy on countless jobs. From Spiral Screw Deirees to Tep Wesselve and from Astomatic Driffs to Bit Branca, rach "Yankon" Toul has been painetakingly designed to get things done. Inpenious and dependable, "Yankee" Took have concerbsted to the efficiency of American production for mearly half a century. Today, of course, they've game to war, and even our all-out effect cannot ment every warrious demand. Order from your supply house, or write North Bros. Mfg. Co., Dept. MMS-20, Phila., Ps. Farnish priority rations whenever possible, and every effect will be made to fit year orders.

YANKEE" TOOLS North Bros. Mfg. Co., Phila. 33, U. S. A. Established 1880

"COURT SENS BOOK POR TO A SERVICE SENS BOOK

residently to the Zone shelf-and in one more vesses to be sled one --a Jan. reportable one freing to through that corder to get at the t Aspiral of the Zone, right on who sle, was as restore so the errord been completed, "62" had also be released and was in the brush of Since See, second, and third soled walkfrance are requirely done of \$ nurthern and the error stational at the Zone have confined themselves laves require little or so repair facility but all those of the Pensons Air E poi have been made available If asses nov. Berara Sun officials are th in series of the conservation raises from the Art Service Command. while works to show house with 180 Once. for example, an emergency or cine charge was recovery. With a nice. ASC had proposed an earlier of opened the repair hangur for the change; which mount a carpo place we delayed coly a matter of banes mate Although not originally designed for the marroon, the healthan convent it ATC has proved exceptionally well on for the put to be done, since access modelmen for earge, mail, and passe row have, with very few ablences beca mede possible under one rect for the 15-odd employees harding softline but mail, which has been such a vital mert of contrations the 1,000 ft, of expansiv is one of the sard service mad. Since the few of single rie meteriale movine north has be ighter than the bet freight most with, this weight-space can be set as without herepeting the line's second Treeblish decks have been but with the building provingly builty stoothouse to sleeplify carpo hast leg for the various roote station

which here their own actions rush of by signs. Here, so at the other red, specially-trained areas under AD expertition make short shift of Loads. North-hound passenger travel heavyer than south-house, for Fann Run Streetly becomes a men perness the majority of its passenness if cervice men pettour back to the "could Sor the first time in three to four our

Sprague of this harries tends curse from that applying to bound passengers, (Para to our Se ATTATION, September 186 ATTACION, September, 1841





"at the end of the curies of

IT PARTS

rubs-felt against felt and 2 rubs Be-footing took place at a Wast ner crole-the eighteen Booth to leaver than before. The new flicht crew come abound with three additional felt merimens were measured for went, Only 4 specimens showed core excepts to the United States to constant there 2.465 decrease in this force of the control of the thickness and Subsecodious them places to add to the growing strength 2.9%,"-From lab. report.

Arrangements had been made by keen his aformald date with matrices of the many characteristics closely controlled in the manufeeture of Booth "prescription" of re-fueleg-both of piece and pur-THE ROOTH FELT COMPANY 482 19th Street Breeklyn, N. Y. TAX Starryman Steres Occase III

that stop had hear arms been of tonded There, too, was evidence of the trainthe rooms from minds not Yours report same in, pixing a 200 ft, colling. EIT . . Comtains spotches of 2.4 E felt types, with specifica-tion tables. Frite for it. (No He "sweet it out" for easte a while, nation follow-over 1 wome of cloud at 200 ft. The tending he made was one of those that ever old twee were offered. But he, being a good instructor, promptly replied, "Thanks, but the Laurement did it.

their jobs



DESIGN

Again the scheduled departure was

The work house outs rectal door.

plante, since the passenger-lates plant

to saver with the rast mammity that

the "old hands" don't have to four for

shortly before medomerane.

 ENGINEERING · MANUFACTURE

WEIDED THREE ASSESSMENTS

. . . DOD AMPERATE WOW

SUPPLIES THE HATIGUES MORE. ING PORCES ST MORE THAN M AND AND MANUSACTURES.



TIATION, Deptember, 2949 AVIATION, September 250

het freight through to keep the maker willow be the nix impoded mouden benefits—the tree of the long day's flight. Hat goose at of them were setting back to the m of every American midury an operator, complete with "dead anger cann with speny tripartin any so is been. They carried

ols vade to follow one of the toursas every boar of the day to make or other for ATC rese. The first as out the door prestately bound the und walking it affectionately as he by the time the last manager had on almost through envices, mongraice offer or duty had completed memorals to set them off on the conspeculious officer had PX's the into bank to remplete another ers floots. And but as low before. even had been of loaded and the miled to want sirely back south acres tive routerdy come on was you The many new benkings, the ed, significant, and knothered god which will meen Reason Raw's

And while we case equild say definitely The Case for

Integral Power Plant (Continued from page 151) old to capplied with a preved integral over piers. The esteriod the newterestable translation on by police B a cross of leaves what country major comer plant record testing Special, and amproper aircdones, to

fem tell scale Right date. "He readle have been must benefnext, that the power plant egg to a rood thing. OLay, who is going to do main'd with complete date on power sign the run, and for what place? had and the probabilition, which will

from and works with the browledge that the religiblity of the combination has been proceed. The bracell of the work a shows by the fact that there well-known mally-engine markings in Porton have evalue interval never plants developed up to the buffthead by the engar besider; then us of everse, in sourceters with the sirplans con-

interest womer minute with acrossled radial types and units busid cooled

The result of the studies made were power classes, approhaserealities was province of State consessions on crossrection of the bulkhead mar. "This study was made with partimier reference to modific member on wings. It m, of course, expended in, sed the sensor, the ATC trumpor , that improved sirplane design may warunco, particularly of unrisemains and twin-region cambel types. However, engine type of eraft in which integral never riberts can be used to ment adwell worth careful consideration." The enderwerent by Mr Eller is partiewherly pertured For 7 and 7 show two such Postols

externed never plants made by the Brisder edens with German planes. friller some will be musy flame then? The new margon, "power one" berrytth, Henry Ford's operationing

plant plan. For if the plan is rough Lt Comtr. Servenment has very kndy written a discussion that he "I see that we will have seened



born of experience

Mercury confirmaneato was built up though more voted exclusively to the eritions to deliver visible needed posts quickly . . without the delay of plant of heatfir testead workers.

aleminum tanka For instance, place 2 is or completely equipped unit formier deather midden creedining teeting and point log progressing streethly ableing about to contoner

one densed on Marrory quality and deliveries olike for torsky mutanes At the Paralle of Assessmen







mental function or detailed from and

leaving the other two to denge, halld

percent specifications. Having these per

and should have been concentrated on

seen though one removes would be

petting the better pleas and more of then, and they would be identical. New

they have to be careful to have opere

Why? Just to unture the new of the

manufacturer who produced the morner

Here again there are two apples to be

feld or about then it will be rough

named to handly complessively small,

whin, without repenally heavy gran,

and while this is available in a currier or at a horse field, it's a postic mond hat "

si won't be at an advanced hope-part

wise arrespont holds for sugargiouse

replacement or repair sufficiently or grath to recent replacing the whole

and elector, repetially abound shyp-"Very few items in the ogg will wonl

both objects. Hardfor the whole are would be superetteable, if not many

caribbeed entitiony and commercial.

New for the replacement feature:

"As for the military, whether in the

The point is that the Army would be

hubbing a place designed by another,



down test, four units to have the same degree of rotation. In a hurry, of

contact first a namedo: then production

Clerenat engineers weeked out the as

sewbly here shown from standard units

and parts, again demonstrating how time, money and effect are seven by the ingenious adaptation of the Circu

stat wide shours of standard units and



freize, increased officency of openchemen make clean, bane out china gire lasger bir life, \$\$MOVABLE PLOTS, hardened and ground, purper the point is your accrees come In considering ways to supercor you own product a drage for pealing without undue blade stress Streight or topened shoots. PROMPT DELIVERS en reitable priprite edvantages, in performance and on eccounty, of compact design, savings is weight, infrequent inbacation and im adopting this new-day bearing to 300 fature designs. Catalog No. 114 helis corn, return and trustel anchouse will prove helpful, also, no preferrat

THE TORRIBOTOR COMPAR alex H Clark C ATTOMY, Separator 1841

Wide for Bulletin blv 5000

sabetactial approxime accounted RECISIO SLADES of precision-proceed

High Speed Steel set with 11-degree

from rot from road amough ... release

TORRINGTON NEEDLE BEARINGS AVIATION, Sections 199





tors one "block-husting" enemy installations from one end of the earth to the other. And round the clock we are turning out RBC Aircraft Needle Bearings for use in the wing flaps and landing over of these B24's and for many other types of military and naval planes-

BEARING CO. of AMERICA TRENTON .... NEW JERSEY

Round the clock these beavy 4 motored Liberabombers, fighters and transports.

m other of lates or small mit. it is sembalde that more than the will need poplacement. If any acsy needs replacement due to make circular from other reason, it will dubly he about no enery for the mend error to replace the known misreset as to change the whole set up. minima all lane and mine "In the commercial field, the eviation such might offer a better sent for the per plant age I my 'might' admetr, for the name arguments re resay or replacement of mosts when markly reflect then the whole own mil one little item often formalies when embaring support any commercial est of maintaining same. In monotime awill the number of plazes they oper-

her man by the hour or have to show they shareholders a graff. Men work bel get angebony extra in prace or paterned whose the power plant opp of only would be welcome but helpful. But in any case it would apply only to that model plans for which it was do-Cated States coupleys exactly the same year pleat moisflation in any two of a fact, many are different installations 'Is state of the animore of various lets to full us this enteguey) this is not Olivedelaces on the most of the mann.

"In any case, my peternal operior in that Dr. Moon' practure of interchance. Dr. Conde Setrement condular ha did not the description, but it by no been chargeder an opposite posst of vew Rather, ri se to be burne in sund

Fg. 1: will destroy no initiative but he

cond . It lead to evindua power plants

letawn. Ther make what their eu-

d become It is they were namedy and

tor the plen we are presented to the Propert series (and on dissertated to



PILOT LIGHT for GROUNDED PANELS e Mante I' as amban. · Beds larget approximately 2". · Taken Reports model loop. · Heshody permits socket wouch · Founded James Marchel 100.

· Bulle sharps from the front without disturbing wiring.

MANUFACTURING COMPANY

e Main James Market 981



TAILOR-MADE WELDMENTS FOR INDUSTRIAL LISES e We are segment, febricators and eligenous iron work, Our exercisity, Harmani exercisioner ness toke for heavy industry. We

serve some of the notion's leaders in signed conductor pictor, not er, copper and brass, charrical, make whiteness and many other fields

VINGTON STEEL & IPON WORKS

AVIATION, September, 186 4VIATION, September. 1943



There was a time that Wiry Jos was merely the largest independent man-

Mose. Where loss in when brooking on our bearing shift at many production. includes starter cable, hagh tension. cebis, primary cebis, both original makes power and welding cable. coble wee. a name for quality, so, too, has Wire has existing cable Proces rigid Army and Naper energifications.

ity, december(Sty, bish efficiency and beer life. Intuities reporting wire and colds

for any type of service will be an-

weered promptly

VIATION CABLE

midsty of newbacture as much mental to wartoon new in being furthered by the manufacture of annious members and in perallel as undergradent course which are later assumbled to give a sumplete apparates. The integral piper plant before this sicular The internal plan will enable innecessaries to be made with secretar over A redmirrord newer when section our be used with an existent plane design. or a redesigned plane with an existing recover piless. And there south will be

Characters of the Plans After the brief presentation of these en, a little discussion was unblished Since then a number of engineers have here hind enough to send the uniter

or operialized as to recovered an unifed ort. In this way, there will be seene-plaisment of all the progress hoped for both by Candy, foreengous and by the

Advertiges of Integral Power Plants

additional discussions. Here in Part L. concluding Part II (to appear in Oct. Avveront the years of various other non will be offered. Particularly it will be neen that those engineers have gride different pleas, both pay and conall of which hear pertincatly in our We will open Part II with a sundelenation of turberspephargum in inlegral power plants. Then we will pernest our proposals of a definite when

for the integral plant system which it proc and come expressed by the industry THE SELECTION AND RES

America At War (Comboned from page 113) fereir was a wildren satellature. Name there be left in Nameous) was a small part of the great separation engaged principally in producing submarines to stinck our shippens, In Hambers as













LET'S MAKE 'EM

Ready? Houst We'll show 'em a thing or two

REMEMBER

CREW OF '43

about production. And have up some records they can't form." Eur for war, they might cover see the inside of an infunttial plant. But here they are—throusands of older men and women—giving their best 30 overcome lack of experience—to keep faith with our lighting freese -to make more than vital exercises are meither ton little As these new workers take the places of experienced rees, more and more Hevi-Lift House are beinger these.

to facilitate the handling of heavy loads on and off machine tools, along assentibly Loss, in shipping decan leaser labor, save time, and speed the war effort Dell Maye-ful Hours

Built in expecities up to 15 tons. Five-step variable speed push-button control is available for littley, low ented or hucinostal troffey trevel. Write for therefore.

General Officer 4551 W. National Ave. Milesulve. Wie





Compant, Brandy See storing or

OTC

OC PLANTS provide electricity to Avendes Applications, for Emer offer, and remain service at Abports and Monton. -Throughold of these subable, story Florito are doing a whating jub he America's stiply Air Power, providing covers for Emring, Communications, Cultin Enter the communication of fundamentary and other revisions.

or from 250 to \$5,000 worse 50 to 600 cycles, 120 to 600 D.C. 8 to 4000 mile. Also A.C. and D.C. reigns models. worth glody hamished on you

B W BNAN A SONS HIM BOTALSPER AVENUE A MINTERPOLIES, MINTERPOLIES

**GATE GUARDS ARE** 

DOUBLE THEIR EFFICIENCY

oy cid walk-or sings instantly or even be guard's ambarity is backed up by the mbinstion of psychological and physical

by Plant Gate Protection broden technical editions that many is mirror correctly Franchis spinors with body you droppe a project for

defember firbare size a vital material can be renamably sertain that the Albel offensend has not, as of any give tame, deficied whether to expect a (beman exhipse as a result of air attack. There is always the temption there of production which emittered to many places, our be kneeked cut with the toes of bumbs to the square sub. 3 counts alterative. But when you from it cot, at the rate of 2,000 tens a de-(which is fast week), that dind of pregreen would add take a light time and it would cost a lot us torong of moore men, which is more important. The war would rather give time and more

then give their near. On the other have time of best if he others of the present rate. But Ann leaders kept that we and our Affect will set tired it Agiting and spit in two or those puer They ever have nemething them, at that judging by recent moves of productive charts. We have to keep hitting the And there are the Resease. hed wer to sigh small time stuff onnamed to there. We have burningly of Cornando actually in combal, to their milion. Their losses are proportions. they are not sure what recults or bombine will being, and they still was

Dat at month and have in tenant of

many where she is ensure territoria. worker dischargest is definitely a tax

during the county. Outstanding was the raid on the Pioceti referries, when Go.

solutated 2-26 Liberators made a 2-66.

areas to drawp 300 tons of bench- or

the receipt angle seams of Lafrage

guestes. The Libergiors went to a

read top levels in the "greatest in level man raid in history" with 17

places participating Our correction

WITH PEREY TURNSTILES spring affection to hapte. ----ARE STANDARD

FOURWENT IN Aircraft Pleats New Yards Lipyarde Arresols &

from the beginning of the war. the could not fown for or ten former tone of beathe a day, which could be youd doubt plow up those thronts named miles of German wheat. Ther any-perhaps state-dut " could have been done with pelatric ser if we had not our major energy or fi

or to wade in and fight on the ground

line, and free the Germans in suffice-

to fight in the West. If they did that

we would be un arrest support &

with beroosts and machine our or

ther compared for a value army. Bet to man our yet say who is right short that. And business it is a brunner Reporting of pres and core on an sewer, Afted strategie svintius bes done plucie ti. In Terron and Statly, and nation for our editament from a design berned belief. Officers who were on the were dispussed. They expected at least

to fight a hard deleving action that would be a grade to their personal from lestend, they found their secondy wester. tore up, their sig fields unusable, their such, and their freep executivations pided. Warrer they turned they were Irentrated. They had to reprender, and sadistic Navia week The Affine have a hir advantage on freedom from attack on their air industern as point earlier. Their want herput advertage is namely as their alla are Bellein and the United States have arbaned a darree of accounting for which their statesmen deserve fully m mark medit as do the smallest con-Ber have developed a complete Time of simpleses for all purposes. These earth from minitigant analysis of mar

For the Axis this formula sarries. the minus orgu, for an fact there is no Axe. Halv was above a bubbler and Jopan serves only at a diversion, al-German have no common leterant on mpi aggression on other neutrice' mean. erir. They have no eventure production and accords worth come more, metals and company tous north to spend; of, and if they did setuca co Cheir separate fronte. Geometry's sir bhits taught the world be forgutten or will at The side that develope the air force but has a distiert advantage. A bie menouen of from designs in a good thing if it

Mar in a lifts. But if the variety poerver enough to health air revers as the Alkes did, be has seen all the tricks there is no anheldeds for industrial prace, which the Axis Spaces morer had is reflerent measure. Their great power was in a spoing which they had been. value up for oven years. It is you. No. down. Our power to an engine we pleaty of feel for constant speci-

MITTEX COMPOSITION . . . show you the dif-Servicel Bodo Shouls for Posticules Published



ANODEX and METEX Compounds for Cleaning Basis Metals When you see MecDermid individually developed commicelly and matellargically alway product for those fester action, positive corresponds are formulated, tested and avad for evicties producties. This see a does owny with quest work and by essuring swift

Let us show you the corepound developed for your problem . . . belg you speed up and impreve you product. A quested service angl-near will be pleased to cell in on-

WATERBURY, CONNECTICUT

ATTUTION, September, 1943

AVIATION, Sections, 1804

strategy as old as the bills has beer pad to use by the Alber in the all site i on Karope. If a book hite of tage and puts it clear out of busi-





to see of I things flower flows remarks for lighting coals. & sixting Glass windshield.

Much of Libber - Owens - Ford Production is Devoted to Classes Vision and Safer Aircraft Glass \* Libber Owner Ford's production of warters ma-



terials in illustrated by the above somes showing assembly of alograft enclosures. In the larger, the assembly of a caregy, or "greenhoose", for a wellbecame fighting place is nearing completion. The windshield above in the smaller shotocrash contains Beller-Revienze Class, a product of L-O-F Research for better vision and greater protection. It is this conserve for highly proving and recoloration by thoroughly skilled workers, when the yest store of knowledge obteined from over a quarter of a con-

There are more other Applements that have come from the engineering behaviories of Libber-Overa-Ford for both vactorie and peacetime use. We welcome the opportunity to co-operate with already and altied manufacturers to supplying technical emistance, Libber-Owen-Ford Glass Compeny, 7493 Nicholas Buildian, Tolodo 3, Ohio.



PIPE AND TURE BENDING IS OUR BUSINESS

CONSULT a year problems to Flow and fabe Bending, Colling, Exponding Fiette



pipes and tubes of all types of metal specialty. On all work to hand benders and shoping, Swap is souleped to produce on o aros scale production bonia or on a smell scyle for experimental purtiske oriventage of our free odvisory analyses.

north and south of Japan.

Here of home, production has nearly leveled off feat above the 7,000 share.

per-manth mark, on this is written, but

the 10,000 rate by the end of the year.

he general—there are enceptions—the

surplace producers in astinfactory. Man-

country, but in others it is terrible. The

Industry's only change of netfers any

weeder of good workers in from whete

The two worst impediments of air-

plane production are deven chances

and the let down attitude that to recall one from victories. Nelson and all his

success to these popularies. They want

well biround with what has been Asse.

The enemy can be taken with the news. and train of ordinal but most overholder

wants more planes to do it quebec. We can do the sob with surrent trees.

no service. You'll find es belotal on problems arreleting pipe and tabe alooping, and assem-bling and testing, too. Wille today for suggest

lice on any job is corn. tection with the type of Profesional Aug.

ATTATION Separator, 180 STATION, September, 1862

news, that in fine. But if the tampet in only executed and to exhaust to remove LIGHT of in then left slowe would a but of these and material has been per into rehebits taling. Then it is hit every. It's the FLOORS In the Parific proupers in claw, but mare and more American planes are perring mie the fight. Fermations of 50 and 200 heavy bembers are saw frequently reported elizating Jap posfines. Up to 150 tons or many of bombs have been laid on a tarred in one day The county small in comparison with

operations in Europe, but it is nearly as his as nearly at his as needs of the Navis' heavy attecks on Earland. D'e heavy stuff in the Jay league, and their news common people of corrected are defeate London com that a fleet of Television in hear hadt on in China at rough from which we could hit Jenus. This could be so, but the highest Asserten air officials have said that there is no greekpe in China. They indicated we cough eir and on power on that ride of the world to take bases which can be supplied. It mer sees stream that

ighting facilities, plants built for Thomas Cornelated, Desgios and North Asserwords with rathin continued concrete Books placed, that it takes many times the of with gray portland coment or other strength of the speny to ket has when he is thorough of miles near. Teets in Consolidated's pleat at Feet Worth show that the white-remove floor The Jope may not have to well till submerize feet and the evalue Status some plant reflects \$1% more light to first are both being layerfaird, with the underside of wage and provides 20% more light on vertical fects of week. result that Stiffed on power will be increasingly free to join American forces in their task of taking home Because it salveges waste light, a ligh \* decrease abadous and durbarens

P reduces eventrale, benduches and P reduces architects, errors, speci-I feerman quantity and quality of flew of materials and components to ing, occurrenal damp mapping, period-Write for new book, "Light Proces

locat." It gives detailed information on he value, installation and maintenance of light-ordering contrate floor mad-with Atlan White portland comme States Steel Corporation Subjectiony), Chrysler Euliding, New York City.

ATLAS WHITE CEMENT



## as a Trained WEATHER FORECASTER

never opportunity with a triple oftendance. As a total-order fraction—(1) one can sective an important positive in metrics gived unvailable liability—(2) year row he of fee question has no year measing when reliad to gallering species. (2) year con-mently fee a spinedfield like-time conservae as produced an active round to the prohibitors produced to produce and active round to the prohibitors produced as a produced metrics and to the prohibitors produced as a produced metrics. Phone is on immensing pand for turbed weather forecaster existing. The U.S. Army Air Figure, the Civil Service and Astron or experiments a critical shortens of manacolosemplery late preferry positions in worther statutes of the six insee and other introduce of the convenience industry. Others have needed sight advantaged in the manual forms and place Exceptional appartmentor one about he both man and wrome to this exceptible light and the School of Mateurology of the SPARTAN School of Assessming has the Booker, brigains lead-

PAPERS School or Astronomics him the Harlest Woman Pener Success

w restrictionary Considered Essential to the West Portry Considered in Information Engineering Engineering Engineering Confederation Control (Engineering Engineering Confederation C

portions books for the discountaines of instruction, markets of tribing weeks of motion equipment, and quelity of graduits OFASTAN cont offers you superior specialized business in these eviction curveus: Continuential or Alebas Files, Filips Indees for, Alexand, or Engine Machemie, Astronomical or Author Ma-lemans: Engineering, Series Communications and Series a

## Condings your education of this "Detrainely of Aviation" Here semantic in Weather Propagation shade Sent. 27th. Said SPARTAN SCHOOL OF AERONAUTICS

and COLLEGE OF AFRONAUTICAL ENGINEERING

SPARTAN SERVICE OF AMERICANTICS COST Manual W Safter, Streeter, and any part for the description of the Printers

Mintella Proper O Private Prior Treater for

Rombins the American Way (Continued from page 139) power to fight back and will

are in the works, two or flow iers, and other combat planes. To and De George Lewis, research r of the National Advisory Comfor Accommiss, is done your work with manufacturers, horther development programs. or west now, to abvers, as mare or wrote are the Almorett Was stion Councils came up assisted idea for which no provision had made. In that, provision had d where of was committed but to spete in polition, often called for. But imported brighties to come up, dealing with the district of surabs sirplanes efter the

remittee of rearts, and other The Council was powerbon to and hat for itself. That is what

the industry to get busy sed

Write the Arm Chamber will be than sees. A hunt is on for two ted to complete this 23st versew of

thin eviation of war, let us please

not guilagers, determine the surpe biresety of fature testioni minnto This is the fundamental took

confidence assorbition to do percept to our awa positions of AVIATION, September, 36 STIATION, September, 1945

maritime abien, GLES-IF PURLIN is equally pro-limb fabrics evolution colon -- are familion





Yes sentence paramete, such as each sarfolds. Testand weapone miled for, and medium or high-

count air power was timed to nervell operations against a

weapon qualitable to secondish a tree bombus of sirfelds may be et effective assaut reconded air terrote galess service contelletions scatter that a correct bumband

photocophy has been established. mining of humbonstones. force is, therefore, a vital fac-

force protection, and "officers" bombing the enemy, it is growconderably less effective than vollement dedengers fremower in

Here, at Doolittle, we are coordinating every effort and skill to help provide the

To Assum Makes

ations conjument so essential for ictory. This will mean better peace-time 7421 S. Leamis Hird., Chicago, W. L. A.

TO HELP YOUR FOREMEN MEET laus and tomorrous PROBLEMS







in air war, relative firepower has the ELLIOTT SERVICE CO., 219 E. 44th St., New York 17, N. 1 importance as on land and one.



#### BOOM SERBUARY & 1041 WEIGHT, 1024 LRS. S OT.

TRAINING INT COMES COUNTY TOTAL TOTAL THE COMES STREET TOMOSTOW

I'm the Primary Trainer the Arms Air France Shout Years to Develop I'm Safe as a Cradle. conductor, Date Booking PT-17 Knodet ... now

na PTanahme for thousanded bours, Every on the first has at THURSDENSEED PULL. hours Edited in the six There award breds found and found our housen and presides ... seven restaured my mater Than is one third. forthir symbosins. Prent resonant and once sinces. I'm belong, right horses. No wonder I've brought codets in anish Articon...to make the arrush for all the world. 7,367 terror ... and I'm self on good on new.

Description of the san IVI and making Jept in perfect condition on part of Ares

most compound from in the model

Phoenix, Arisons ATTATION Section 17

IATION, September, 1942

Drop us a line today and sed for your copy of this new file failers of on-

index Taking A next

head well know you th'

TO CARRESTER PERE CONTANT

resong. A see

However, there is another factor which has a produced subscure on apprehicus; this we must entergercully label "altalevel burning in subdefined in Tark tumbing. Each re dutinet and bear tache none officing monitorities of a trasugnitions verticity of taction to accounplan e numee or pret p utustres. Alltode Canaderettees

beating is employed at levels up to, operation above that altitude in high trinde boulding, the strplane is flowe at mum altitude bombing out he made

compliance in excess of the ablitude onpresent in feet. This is distributed on turk attack accessed a brandy accepted ship where, with case of mak and fort of abstade owned, the book stylkes the surface and does not reach the faccount it is absent that the fresh on he resulting established and that it would earsty exceed 200 ft, was arrelated of

With recreek to employment of bomberns and insue that con he afterior a absence of our direction counts This may range from ground discrease to wide production engineering purblems. alkainds on so to \$5,000 O and \$1 is well to have expensed evaluable to nt of Walded Soundon Tabons we here

conduct operations throughout this

Here's May 1 hall You All This. Where the list our Hamblesgood Department made expension necessary, the Army May A with you so private your workless. Minimum losses should abovy be an should be determined in the light of security artifacted. Non-records the feet of one heavy bumber on a minute arning a loss meany destroyer is for Assuming that the mount has "adasafety for humbers has at rither en-Green successor altitode or extreme highfeelt for ground elements to truck a speeding low-flying sieptone and to

to set up a harrage. At the same free,

Do You Want TERMINALS?



ADDITIONAL SAUDIAN NOW set on emble on to office our technical service and manufecturing canacity to a wider arms of manufacturers

If you need TERMINALS that will meet all requirements as to accuracy -- uniformity and strength ... If was went then with concendity dispatch We are remarked to meet

sizes. Check with BUCKEYE -cond or your blue-refets and specification and we will be more than gled to gette you. Coursesperfered Invited

2030 W. SSIS St., Cleveland, Ohi

factor arrests are at a development because of Instead drover about Meable for naminary altitude work because care valleres more effectively and to white diction recording. The bears complete bessler is not sufficiently actic arrespo As the pattern of confirmment of sitcoall trees takes more definite where with experience we see the medium bomber resolvably taking once explanes anterpret to the minutes officiale technoppe while the heavy burder opradges in the upstains department.

was allitude bounding to health anshow 1,000 ft However, the mechanral error of a boundaght and offer raterorate merces with along complement breakly thought of technique comme of segacy carego Medium bombers are used for high Web as average total error of 4 in level bembing, too, just as heavier have one 1000 ft. they does not become be hers, employed in measures altitude trems shipsen. However, if is a pa reason for operating at lowest altique Graveally, however, the beavy bumber consistent with everyor busine own re opropped with a synchronous precircum homboleht which rections Crackmy the target by the bushesher Just effective within the reages of 200 n m et to deficult for ground groupen to unck a speeding less flying surplane, a bonderder has ensuderable difficulty HOWEVER, There are every recoms treeling a target on the ground. Trucking error at a honous error or where the largest motifies become when one specifics may proceed a

With sample fund-angle nights, mini-

AIRCRAFT PLYWOOD Available for Immediate Shipment Large Study of Standard and Old Store couled by our Oldense Waveleness for abipment some day order is received. Made in accordance with ANNINFALLS performer. Orders asserting asserted providences will reprive present attention.

CHICAGO 22 SUNDS

As asset before factory which said to enhages bombardwell effections farry's defrences sinhly. As a matter of perfection, if a single boust to single auxwhere but decemby at a target, autilies area bumbing technique of streives a waste of bombs. By far, the most efficient employment of books awareft to for such machine in the mid pay form to make an attempt at \$6 bit probability are cost trues encoununder such employment eve-littings. exposed in the combined effect of sail

circulti batelletione as well as ones her of cashidad bombon attention directions and at varying allitudes w after considerably less apportunity to accords anti-approxity treature, but a excention remains a problem. The where a ecceptivation of fire power or firther organition and all beachers : the formation out out for maked on tertion: Such formations, however, rduce the offrence efficiency of

Efficiency Orandon Asses core, much seem to development of perferren Agreement on process in tive is difficult to find among a count of is larger farmations. Others hold in formatives should include a minimum number of severall which can provi

adorante nurinal protection arrived it tock from our direction. This pends has not been determined and the sail to an far closing "Minimum comb



Brestauched Photo Etched Cutaway Holo-Krome Bolt MASO SPECIFICATIONS **EXCLUSIVE** 

#### HOLO-KROME EFATURES

B-INCHEASED STRENGTH, 3-CONTINUOUS UNCUT LATERALLY DEPLICATE COST PRESS. ALLOCATIMUDES INVENOVEM EXPEN 4-SMOOTH PLAT TOP WITH SUBHR 8-CONCENTRICITY OF HIME WITH

- e-section. TO FIGURE SHAPE ACROSS SECTION BRANCHES IDENTICAL
- P-CONTINUOUS FIRMS ENDING IN B-STINEOSCED SOCKET WALLS
- SDACE and TIME serving features. FUNDER SIDE OF HEAD AND BODY ARE T GEOUND ON ALL HOLO-KEOME HAS EQUTS THEORINAL CONTINUOUS FREQUE

Aircreft Designers because of the WEIGHT. Walte for Male-France Alterest Catalan

HOLO-KROME

Internal B. Wrenching

BOLTS

The better fastening method. Precision made to

NASC energicutions Completely Cold Forced

by the Holo-Krome patented and exclusively

utilized manufacturing process. Acclaimed by

(Turn to many 261)



The Ford-Ferguson Moto-Tur has somer for

heavy jobe-with pleaty to space for all sirport

work. Its wright and low counter of evenity bear.

most when and tall assemblies. Automotive type-

steering, compactness and its YK' turning radius

enable it to wiggle in and out of tight corners.

it may to the ground.

PROPELLER LIFE, Amely street

standy platform, arrested on front of teactor, invaled hydrophesily to proper working level. A kin tamesaror,

make it may to set in and our of buildings The Ford Tractor does an amazing accorder of sirners construction, operation and malescensors jebs. With Perguson Implements it is widely used Oals 46" high, the Moto-Yog slips easily under in the preparation of sail for the new middle. built soil-coment runways. It is readily educted to





BALDOR

GRINDERS

(Continued from some 306). is so light with the efficiency theory, but a marrie is probated on the streing Manager the AAT is complish only standard forces in a count variety of theaters and it seems certain that if there is an answer to this problem of eccuent formations, where a comber of sacrons approx to be probable, the A S.M. will describe it along the lines of secondabler, the masses with the resulted possible officency. From this, that our humber forces are now fring stressed in the preceding article (Aug. Avanuality has provided for maximum derinability to mission requirements. Dir detail enged be receded for seeings, praying, but the determin-











# IT TAKES 100 MEN TO LIFT

### THIS BATON



THE CONDUCTOR waves a little stick and, like magic, entrancing music cascades through the concert hall. With superb artistry, hebrings out every nuance of the symphony, from light lilting run to crashing crescendo. The world calls him a master.

But even the genius of a symphony conductor could not make a baton audible. The music that enraptures the audience flows from the hearts and talents of the orchestra.

In the industrial world, too, there are some who must do the less spectacular jobs. The Joyce Machine Company is an example. Parts, sub-assemblies and machines built by Joyce are playing a major role in scores of great war plants throughout the country, solving difficult production problems, achieving new standards of speed and efficiency, helping to draw nearer the day of Victory.

From the Joyce plant, too, flows production quantities of sub-assemblies for gun mounts and other viral precision parts for implements of war, fabricated and assembled by Joyce craftsmen. The highly developed skills and experience of Joyce engineers and craftsmen are being utilized by the Army, Navy, Maritime and Aircraft services—as well as by the nation's largest industrial organizations. This same skill and experience can be helpful:to you—in meeting present war contracts—in solving postewar production problems. A Joyce representative will be glad to explain in detail the unique advantages we can offen

JOYCE

Machine Company

2000 WHEATSHEE SANE - PHILADIUME
MANUFACTURES OF PRICKION PARTS

108 ALL KEY NOUSEL KEY NOUSEL

BEHIND THE MAN & BEHIND THE MAN & BEHIND THE GUN